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Volume XLIII DECEMBER 1961 Number 5

THE AMERICAN FARM ECONOMIC ASSOCIATION

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FELLOWS
of the
AMERICAN FARM ECONOMIC ASSOCIATION

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ORIS VERNON WELLS
ERNEST CHARLES YOUNG

* Deceased.

ORIS VERNON WELLS

ORIS VERNON WELLS was born in Slate Springs, Mississippi in 1903 and reared in New Mexico ranch country. He received his B.S. degree from New Mexico A. and M. College in 1928. He spent one term at the University of Minnesota (1928) and a year at Harvard University (1931-32) engaged in graduate study of agricultural economics.

In June of 1961 Mr. Wells became Assistant Director General of the Economics Department, Food and Agriculture Organization of the United Nations. Until then, except for a leave of absence while at Harvard, he had been continuously employed in the United States Department of Agriculture since he joined the staff as a junior economist in 1929. His work included some five years in the Division of Farm Management and Costs of the Bureau of Agricultural Economics; and a similar period in the Agricultural Adjustment Administration, first with the Corn-Hog Section and later as Chief of the Production Planning Section. He returned to the Bureau of Agricultural Economics in 1939 and became head of the Program Analysis and Development work. Later he became Assistant Chief in charge of Price and Marketing work, and in May 1946, was appointed Chief of the Bureau, a position he held until the Agricultural Marketing Service was organized in 1953.

As Administrator of the Agricultural Marketing Service from its inception until this year, he was responsible for work engaging more than 10,000 employees involving annual expenditures in excess of $500,000,000. Among the activities under his jurisdiction were: research in the Agricultural Economics, Marketing Economics, Market Development, Market Transportation and Facilities and Statistical Standards Divisions; and the compilation and analysis of statistics in the Agricultural Estimates Division. He also served as coordinator of statistical work in the Department.

He served as President of the American Farm Economic Association in 1949, and has been an active member of the Rural Sociological Society, the American Statistical Association, the American Marketing Association, and the Agricultural History Society. He has also served in many ancillary capacities, including special adviser to the War Food Administration (1942-45) and to the Food and Agriculture Organization (1945-46); a member of the General Administration Board of the USDA Graduate School since 1946; a member of the Moffett Committee on Agricultural and Business Relationships, Harvard Business School, since 1952; member of the FAO Coordinating Committee since 1953; member of the Board of Directors, Commodity Credit Corporation, since November 1951; liaison representative, USDA, to the Food and Nutrition Board, National Research Council, since 1952.

He received an honorary D.Sc. degree from Montana State College in 1950 and an honorary LL.D. degree from New Mexico A. and M. Col-

(Continued on page vi)

ERNEST CHARLES YOUNG

ERNEST CHARLES YOUNG was born September 29, 1892, on a dairy farm in western Pennsylvania. Following graduation from nearby Grove City College, he taught science in the local high school. In the fall of 1916 he went to Cornell University, where following a tour of duty in the U. S. Air Corps, he received his Ph.D. in agricultural Economics in 1921.

Dr. Young was appointed assistant professor of farm management at Purdue University in the fall of 1921. Here he did pioneering work in establishing courses and organizing research in a young department. The academic work succeeded beyond expectation. Dr. Young's courses in management, prices, and finances were popular. Graduate students were attracted to the research program, which has grown until it is now one of the larger graduate programs on the campus.

Dr. Young participated in the planning and organization of the Purdue University Graduate School and has been active in its affairs since its launching in 1929. He became Assistant Dean in 1933 and Dean in 1942. Under his guidance the Graduate School has become one of the largest graduate schools of pure and applied sciences in the United States. In July of 1961 Dr. Young was made Vice President for Research as well as Dean of Purdue's Graduate School.

Dr. Young was Assistant to the Governor of the Farm Credit Administration while on extended leave from the University in 1933-34. While on leave of absence in 1947 to serve as Director of Research for the New York State Temporary Commission on Agriculture, he made an extensive cost study of milk distribution in New York City and other cities in New York State.

Dr. Young was president of the American Farm Economic Association in 1938. He has been active in the International Conference of Agricultural Economists since 1930 and served as American vice president from 1941 to 1952. He has also served several terms as college vice president of the American Society of Farm Managers and Rural Appraisers. In 1947 he was awarded an honorary Doctor of Laws degree from his undergraduate alma mater, Grove City College.

In 1942 he received a substantial grant from the Rockefeller Foundation to undertake a program of research to discover possible applications of industrial engineering techniques, including cost analyses and time studies, to agriculture. This resulted in a significant contribution to the education and research program in farm management in the United States. Projects were established in twelve other land-grant colleges, in addition to Purdue University.

In 1952 he was appointed to the Board of Consultants for Agriculture of the Rockefeller Foundation, and in this capacity he has travelled widely in Latin America, particularly in Mexico and Colombia. He was on leave from the University during February and March of 1961 to act as a special consultant for the Foundation in setting up work in agricul-

tural economics in Colombia. He served for many years on the Agricultural Board of the National Research Council.

Dean Young takes an active part in the affairs of the Midwest Conference on Graduate Study, the Association of Land-Grant Colleges and State Universities, and the Association of Graduate Schools, serving on numerous committees of these various associations.

E. C. Young has long served as an inspiration to young men in his professional field of agricultural economics. Several of today's prominent agricultural economists state that classroom experiences with Dean Young motivated them to seek a career in this field. Perhaps as much as any one man, Dean Young is responsible for the growth, development, and contributions of the Agricultural Economics Department at Purdue University, with which he has been directly associated since 1921. At Purdue University social scientists carry membership and responsibility in Sigma Xi and actively participate in all areas of the university's intellectual activity. The initial casting of the social scientists in this role at this institution is perhaps in no small measure attributable to Dean Young's leadership.

ORIS VERNON WELLS

(Continued from page iii)

lege in 1952. He also received the United States Department of Agricultural Distinguished Service Award in 1954.

In a very real sense, Mr. Wells' career epitomizes the finest in federal public service by a professional agricultural economist. Beginning as a research technician, he progressed in conducting significant analytical studies, and also received increasing supervisory and administrative assignments in research and related activities until he advanced to the top rung of the Civil Service ladder. His technical bulletin on farmers' response to price in hog production, published in 1933, is still cited, and no study can be made of the parity concept without reference to his work. He gained the confidence of the several political administrations of the past thirty years, and of leaders of various programs developed during depression and prosperity, war and peace.

His voracious reading, his prodigious memory, and his keen analytical mind equip Mr. Wells admirably as an administrator of large and diverse activities and also as a source of objective economic information for legislators, government and industry executives, and others concerned with agricultural issues. His personal philosophy, often demonstrated in providing factual information to all parties engaged in policy decisions, is to reduce the area of controversy by getting agreement on the underlying facts, thereby leading to more rational policies clearly based on value judgments.

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Proceedings Issue

BUSHROD W. ALLIN, President AFEA, 1961-62

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RELEVANT FARM ECONOMICS*

BUSHROD W. ALLIN
Economic Research Service, USDA

> . . . One knows people who are as heavy and stupid from undigested learning as others are from overfulness of meat and drink.[1]

JUST 40 years ago this month I began my professional career as a farm cost accountant. To me, that doesn't seem so very long ago, but much has happened since then. Here are some of the measures of change: Today, we have only about half as many farm people and about 60 percent as many farms, but output per man hour of direct labor on farms is four times as great. The budget for the Department of Agriculture is 50 times as large; and price-support loans and inventories (at about $9 billion) are infinitely larger, since there were none at that time.

What will these measures of change show in the year 2001, or 40 years hence? One wag has said there will be one farmer with a half million employees in the Department of Agriculture. Seriously speaking, one can hardly view these changes without anticipating a further substantial shrinkage in the number of farms and farm people, and further increases in agricultural productivity, if not a further increase in Government costs. But I see no prospect that farm economists will work themselves out of a job soon, provided they keep their farm economics relevant to its original and dominant purpose.

The central point of my paper is this: Farm economics came into being because it had a distinctive purpose; and it will cease to be a unique discipline whenever that purpose is lost. The distinctive purpose was and is *to develop ideas and construct mental tools that will help our farm people improve their incomes in relation to those of nonfarm people.*

Our profession began as farm management with only one purpose—to

* Presidential Address.

[1] Huxley, Thomas, *Technical Education, and Other Essays*, Humboldt Library of Popular Science Literature (a periodical), No. 66, New York, March 1885, p. 7, 8.

help the individual farmer raise his income by better management of his farm. That is why the word "farm" is still a part of the name of our Association. The farm management profession never would have developed if there had not been many farms that were being poorly managed. When our profession started out, its dominant assumption was the competitive model. Under this assumption, it followed as the night the day that scientific, profit-maximizing farm management would accomplish our purpose of raising farm income.

But events have demonstrated the inadequacy of this as a complete solution. We later became farm economists with a second purpose of helping farmers *as a group* raise their incomes through stabilizing their output and the prices they receive. Concern over farm output and prices never would have developed if farmers had not been suffering price disparity and believed that group action would help them. We long ago dropped the word "management" from the name of our Association and substituted the name "economic." This addition of "economic" to the "farm" aspect of our profession was not accidental. It testified to the recognized importance of a broader frame of reference for problem-solving than the line fence.

In my opinion farm economists should be proud to help protect the interests of farmers through public decision. If our economy conformed roughly to the requirements of the competitive model, there would be no need for farm economists concerned with farm programs to balance supplies with demand at reasonable prices. There would only be a need for farm economists to help individual farmers maximize their profits and take advantage of smoothly working factor markets. *It is the very fact that the economy is something quite different from the competitive model that has given farm economics its special character.*

Yet many still write and speak as if the farm price and income problem is an emergency problem that will go away if only a little more medicine out of the bottle of "free competition" would be taken. Experience during much of the fifties raises serious doubts concerning this belief. We now know from the analysis of William E. Hendrix, that the impediments to farm-nonfarm labor transfers do not reside in the skins of farm people themselves but in the structure and growth characteristics of the general economy.[2] Hence, the farm problem is a *chronic* rather than an emergency or temporary problem, and is not due only to the farmer's lack of either capital or knowledge of nonfarm job opportunities. It is not one that can be solved merely by "free" farm prices.

For farm economists who wish to keep their farm economics relevant to the real farm price and income problem, I here discuss five guidelines:

[2] See: Hendrix, William E., "Income Improvement Prospects In Low-Income Areas," Proceedings Issue, *J. Farm Econ.*, Vol. XLI, No. 5, Dec. 1959, pp. 1065-1075.

(1) Ignore inter-disciplinary boundaries, (2) understand the relation between economics and ethics, (3) understand the meaning of "freedom," (4) encourage farmer organization for self-help, and (5) distinguish the double meanings of "surplus."

(1) Ignore Inter-disciplinary Boundaries

My inspiration for the first of these five guidelines is none other than the eminent British economist, Lionel Robbins, who has said to economists in general: "In the excitement of perfecting our instruments of analysis we have tended to neglect the study of the framework which they assume. There is an urgent need for the best minds of the rising generation to apply themselves to this task of institutional invention in the light of patient, realistic investigations."[3]

Shades of Thorstein Veblen and John R. Commons! This is sound advice from Professor Robbins. Veblen's central contribution was to show the limited relevance of the *framework* assumed by most economists even of his time, and Commons became an institutional inventor supreme. Even though, as Robbins points out, many economists are now neglecting the study of the framework they assume,[4] the Department of Justice and Senator Kefauver are not. As a matter of fact, it is the propensity for institutional invention with one eye on the *framework* that has distinguished an active segment of our Association. Our first president, William J. Spillman, wrote a book containing the early version of the domestic allotment.[5] Another conspicuous member of this glorious group is M. L. Wilson. He knew, as he worked, that his attainable goal was not the ideal of *eliminating* human stupidity, but only the practical goal of *reducing* it. He knew also that this can be done only by those who realize that the limiting factor in dealing with practical economic problems is frequently to be found in social science disciplines other than economics.

A most significant recent illustration of this point is to be found in the enthusiastic reception our Association has accorded our philosopher-economist fellow member, John Brewster, in his analysis of value-judgments and their relation to farm price policy.[6] The theory or study of value-judgments is philosophy and ethics. Value-judgments are what Veblen called people's "habitual ways of looking at things." Brewster's

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[3] Robbins, Lionel, *The Economic Problems in Peace and War,* Macmillan & Co., Ltd., London, 1947, p. 84.

[4] For a recent example of this neglect, see especially: Brandt, Karl "Guidelines for a Constructive Revision of Agricultural Policy in the Coming Decade," *J. Farm Econ.,* Vol. XLIII, Feb. 1961, lower half of page 6.

[5] Spillman, William J., *Balancing the Farm Output,* Orange Judd Publishing Co., New York, 1927, 126 pages.

[6] See: Brewster, John M., "Impact of Technical Advance and Migration on Agricultural Society and Policy," Proceedings Issue, *J. Farm Econ.,* Vol. XLI, No. 5, Dec. 1959, pp. 1169-1184.

juxtaposition of the American farmer's work ethic, democratic creed, and private enterprise creed, together with his exposition of why they are in conflict, pinpoints a limiting factor in dealing with the farm price problem. It also explains the effectiveness during the past 8 years of such slogans as "freedom to farm." It shows how the farmer's desire for price policy that gives him a fair return for what he produces runs into head-on conflict with his desire for policies that place no constraints on his power to run his business as he pleases. Either choice, of course, is consistent with the democratic belief in the right of each individual to an equal voice in laying down the rules all must obey for the sake of the general welfare, which is the essence of democratic freedom.

Twenty years ago the meaning of "freedom to farm" was described by Commons when he wrote:

> The independent American farmer, owning and operating his own farm, is as near the ideal of the classical economists as can be found in practice. The American farmer, too, philosophizes closely along the lines of the classical economists, except when he is in misfortune. Hence the transition from his pioneer independence into political activity and involvement in the problems of administrative economics will illustrate quite precisely the transition from nineteenth century to twentieth century economics. It happens, interestingly enough, that this transition is personified in one family of agricultural editors, the Wallace family, father, son, and grandson. Uncle Henry, the grandfather, was preacher, farmer, editor, advocating good (clean) living, education, and scientific farming. This is reliance upon individual action. His son Henry C. Wallace was Secretary of Agriculture in the administrations of Presidents Harding and Coolidge. He became an advocate of direct governmental action in the interest of agriculture, through his sponsorship of the McNary-Haugen "two-price" plan of farm relief. The grandson, Henry A. Wallace, became Secretary of Agriculture in the Roosevelt Cabinet of 1933 and put into operation all the major "New Deal" farm programs. Their views and policies typify the transition in less than 40 years, from individual action to the transactions which make the farmer dependent upon the actions of others, . . . from home agriculture to commercial agriculture, and lately distinguished as a time of direct action by governmental agencies to influence the income and opportunities of farmers.[7]

With the advent of the New Frontier and the passage of the Feed Grains Bill, the stage is still set for institutional invention on a grand scale. But being traditionally attuned to the atomistic structure of the competitive theory of economic organization, the farmer will desert that theory most easily only during "misfortune." It is at such times that he thinks the facts of economic life do not square with his sense of economic justice.

When Professor Robbins invites economists to study the *framework* they assume he is inviting them to cross inter-disciplinary boundaries—to

[7] Commons, John R., *The Economics of Collective Action*, The Macmillan Co., New York, 1950, p. 209.

cruise, in fact, the whole field of social science. And his plea for "realistic" investigations as a requirement for institutional invention means that the economist may have to investigate more than economic phenomena if he is to find a basis for practical action to deal with economic problems. A farm economics that is relevant to the farm income problem cannot be constructed in a political vacuum except as pure theory. And no institutional invention was ever lifted as a norm from pure theory. So, my first guideline is that in order to keep farm economics related to its principal purpose, farm economists are concerned with any subject matter that is found upon investigation to be a limiting factor.

(2) Relation Between Economics and Ethics

Economic theory, as generally defined by economists, assumes institutions and leaves their investigation to other disciplines such as law, political science, history, sociology and philosophy. Its modern proliferation is largely a mathematical statement of the functional relationships derived by the study of supply, demand and price—measured in dollars. This may be either micro or macro but is too often reasoning from the assumptions of the competitive model to policy conclusions or value-judgments. In my view, this is a misuse of scientific theory, economic or otherwise. The great and correct utility of our economic models lies in their power to clarify means-consequence relationships and serve as guides to *measurement* of the probable effects of alternative policies. They have nothing to say about which policy is right or wrong, good or bad.

Recently, farm economists have made effective use of economic theory in producing a whole rash of studies measuring possible effects of alternative farm price policies. In doing so, they do not reject the use of the analytical tools of economic theory for exploring the means-consequence relationships of policy alternatives. But the most helpful analyses do not use the efficiency ideals of competitive theory as themselves the criteria of policy.

Next summer at Storrs, Conn., we shall help commemorate the Department of Agriculture-Land Grant College Centennial. Many of us are products of these institutional inventions. The Acts creating them were revolutionary social Acts. They never could have been deduced as a norm from our body of theory, but they developed farm economic significance by fostering the establishment of Experiment Stations and Extension Services. As long as these institutions concentrated on agricultural technology and natural science, there seemed to be no need for distinguishing economics from ethics. Economics meant the same thing as the efficiency of physical production and was obviously good. But as soon as farm prices and money incomes became an issue there arose conflicts in value-judgments of the kind I have already mentioned.

Some have sought to resolve the issue by giving normative connotations to the competitive model through implying that the price yielded by a *particular price mechanism* is the right and good price for "society." This is an improper use of the competitive model. As already explained, the presuppositions of this model enable us to predict what is likely to happen *if* certain conditions are met. But there is nothing in the theory to indicate that the consequences are either good or bad, desirable or undesirable. In short, economic theory is not a glorified system of ethics. The actual allocation of scarce resources among individuals, classes and alternative uses, deemed proper in our society, is not the resultant of an unplanned and unguided price mechanism. *Rather the primary determinant of whatever allocation occurs in any society is the organizational arrangements or institutions of that society.*[8]

In contrast to the presuppositions of the competitive model, the price mechanism which exists is actually a complex of institutions, all of which are ethical in the sense that they are creations of man for the sake of purposes deemed good. They are not creations of nature. The competitive model is Utopian, as is the logical structure of all theory. But economic organization and government is an organization of people who are beings of "passion, stupidity, and greed" as well as reason. As Koplin has observed: ". . . Equity and environment factors are rarely absent from economists' policy discussions, but they are there on sufferance on an *ad hoc* basis, often in footnotes or asides. I believe they must be explicitly and systematically incorporated in policy discussions,"[9] as illustrated, for example, in John Schnittker's discussion of "Wheat" at our last winter meeting in St. Louis.[10]

Farm economists who understand the relation of economics to ethics, and who are interested in improving farm incomes, will use economic theory in their investigations, but they will not find their policy answers in their theory, and parrot-like prescribe "free prices" even prior to investigation. They will do what Willard Cochrane did when he recognized that his belief in the Golden Rule was ethics and not economics.[11]

(3) The Meaning of Freedom

Few terms are so loaded with confusion as the word freedom. It can have the negative meaning of absence of Government restraints on in-

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[8] Ayres, Clarence E., "Institutional Economics—Discussion," Papers and Proceedings, *American Economic Review*, Vol. XLVII, May 1957, No. 2, p. 26.

[9] Koplin, H. Thomas, "Public Utilities and Transportation—Discussion," Papers and Proceedings, *American Economic Review*, Vol. LI, May 1961, No. 2, p. 336.

[10] Schnittker, John A., "Wheat: A Permanent Need for a Farm Program," Papers and Proceedings, *American Economic Review*, Vol. LI, May 1961, No. 2, pp. 341-352.

[11] Cochrane, Willard W., *Farm Prices—Myth or Reality*, Univ. of Minn. Press, Minneapolis, 1958, p. 129-130.

dividual action, or it can have the positive democratic meaning of the right of each to an equal voice in determining the restraints all must observe for the common good. Thus, when the word is used it is important to know which meaning is intended and for what purpose. The first of these two meanings, as Brewster has pointed out, is the heart of our farmers' distrust of Government and their predilection for extreme individualism. It is rooted deep in past experience or history. But events today are not those of yesterday. The old frontier was a frontier of nature conquered by such extreme individualists as Daniel Boone and Davy Crockett. To conquer the new frontier, institutional inventors are faced with different realities which include "great corporate enterprises and labor unions, both possessing a great deal of power to protect themselves from competitive forces, and Government agencies exercising increasing power over the outcome."[12] These realities are the heart of the second meaning of freedom.

Freedom, in the positive democratic meaning, is the product of individual humans acting together. And one of these products is the substitution of the rule of competition for the rule of an arbitrary sovereign. But in Anglo-American law the rule of competition has meant the application of the principle of the "willing buyer and willing seller." Legal competition is considered to prevail in transactions free from duress, coercion and fraud—transactions free from discrimination and unequal opportunity. In other words, it has long been recognized in law that one man's liberty or freedom is another man's exposure to that liberty.

Economic theory assumes all of this under the phrase "law and order," but the real differences among economists usually concern the evolving changes in law and order. Minor changes are often opposed as invitations to a new Hitler to re-establish a totalitarian state, even when both the purpose and the prospect is not to destroy competition but only to make it more civilized. For those to whom pure competition is an article of faith, it is impossible for farmers to have too much freedom to compete. Yet the slightest reflection reveals that freedom to compete as individuals is not the only kind of freedom. Freedom to associate is fully as important for the survival of democracy because it places limits on the freedom of one person to be exposed to the extreme effects of another man's competition. When the right of voluntary association is abolished, dictatorship has arrived.

One of the greatest confusions of our times concerns the relative roles of the individual and the group in modern democracy. A recent example of one form of these two complementary roles is afforded by the history of the Iowa Agricultural Adjustment Center. An individual Iowa farmer

[12] Clark, John M., *Guideposts in Time of Change*, Harper & Brothers, New York, 1949, page 62.

became convinced in his own mind (not because of the commands of a dictator) that the promise of agricultural education in his State had been somewhat greater than its fulfillment as far as its effect on his economic well-being was concerned. He concluded that agricultural education had achieved phenomenal results with respect to his *producing power* but that this power was not showing up satisfactorily on his profit and loss statement. From discussions with his neighbors, he inferred that they, as individuals, felt the same way about the matter as he did. So he engaged in a little individual decision-making and invited 18 of his neighbors to his home for some private collective decision-making and action. The action was to make appointments with the administrative officials of Iowa State University. The outcome was that they gave the University a new sense of direction.[13]

The Iowa incident illustrates what Robert Spitze calls three aspects of the process of institutional invention: (1) Individual decision-making; (2) private group action, and (3) public action. The significant thing about this case was that the impetus for change arose in the decision of an individual farmer whose interests were affected. It then became action by a private informal group, and finally by administrators of a public institution. Conceivably, it might have been started at any of these levels —by action of an official of a local, State or national farm organization, by a university official or by an economist at the university. But irrespective of the point of origin, as a democratic process it involves both individual and collective action to "control, liberate, and expand individual action." To be sure, this particular action was directed at the nature of education and research; but the purpose of education is to affect the way men act.

Shift the Iowa process to the national scene and note the differences. Instead of an informal group of farmers meeting with the officials of an educational institution, representatives or organized commodity groups and general farm organizations, aided by economists from the States and the Department of Agriculture, meet with congressional committees to sponsor changes in agricultural legislation. Very often there is no unanimity. Interests conflict. No one clear voice is heard by those who would seek the votes of farmers. That was the recent situation as public debate on farm policy centered on the Omnibus Bill.[14] In the absence of agreement on policy, attention was centered on the effort to get agreement on a procedure for working out agreement on policy.

Everywhere it is recognized that under our existing economic organization farmers are at a disadvantage in bargaining with big business and big labor unless this disadvantage is somehow offset by the power of

[13] "The Center for Agricultural Adjustment," by various authors, Proceedings Issue, *J. of Farm Econ.*, Vol. XLII, Dec. 1960, No. 5, pp. 1114-1138.

[14] The Agricultural Act of 1961: H.R. 6400 and S. 1643.

Government. We all know that wherever surpluses occur in the economy it is evidence of a misuse of resources, as is unused productive capacity. We all know, also, that we cannot rely exclusively on the price mechanism. With these two points agreed to, let farm economists get on with the investigations needed to determine precisely what will be done. In doing so, they will be confronted with the importance of coming to grips with the democratic meaning of freedom.

(4) Encourage Farmer Organization for Self-Help

"There will always be a weakness in the appeal by farmers to [Government action] as a remedy for their economic weakness. Their appropriations are easily reduced by their opponents in Congress on the plea of economy. If they could organize like a corporation or a trade union, they could finance themselves without imposing themselves wholly on the taxpayers."[15] Thus far, for various obvious reasons producers of the great staples have been unable to do so. The family farm structure has been no match for strong unions and corporate mergers.

The Agriculture Marketing Act of 1929 undertook to encourage cooperatives by extending credit through the Farm Board. This experiment in quasi-public cooperatives was discredited politically; but have we done all that is feasible to encourage farmers to develop their own bargaining power through their own business organizations? The Rural Electrification Administration Co-op, of course, is an example of a quasi-public type, and the operation of marketing orders through dairy co-ops is another. The Farm Credit Administration has made an important contribution.

In his recent Benjamin Hibbard Memorial Lecture, Henry A. Wallace quite understandably expresses considerable skepticism as to whether farmers through their own organizations can ever follow the bargaining tactics of organized labor. He is even opposed to such tactics. "What we all want," he says, "is a broader formula than scrambling madly for competitive equality of bargaining power. All farmers can do is to insist on general action by the Government . . . Cooperatives are good, but they are not enough. . . ."[16] But what is the *formula*? And through what institutions does the farmer *insist*? The answers to these questions would be relevant farm economics.

When we inquire of Mr. Wallace as to what his "broader formula" means, we find it stated more as a goal than a procedure: "Farmers, corporations, and labor unions must join the Government in a really new and powerful program to start the wheels of industry turning in the dark places of the world where our farm technicians have paved the way by releasing an ever larger part of the population from agricultural pur-

[15] Commons, *op. cit.*, page 212.

[16] Wallace, Henry A., "Equality of Bargaining Power and the General Welfare," Benjamin Hibbard Memorial Lecture, March 28, 1961, Madison, Wis.

suits. A truly imaginative program in the backward parts of the world as I have said again and again for 20 years will save us all from internecine feuding."[17]

But what institutional inventions are required to enable farmers to improve their bargaining power by joining the Government with corporations and trade unions? If it is the political process that is implied, what are some of the lessons to be learned from recent experience? The leaders of the largest farm organization opposed the Omnibus Bill. Was this because of a belief that the passage of such a bill would in some way adversely affect the influence of the organization? Did those who supported the bill do so because they had decided they knew what was good for farmers even though the farmers themselves were not agreed on the nature of their difficulties or the appropriate remedies therefor? Was the strategy behind the bill based on a belief that it was more important to get it considered by the city Democrats before they could become irritated by rural Democrats than it was to promote an understanding of the needs for such legislation by a larger proportion of the farmers? The answers to these questions are all relevant farm economics. The limiting factors are the conflicting interests within agriculture and the weak organization for self-help in resolving these conflicts through workable procedures for serving their common interests. The farm economist who would keep his work relevant to the farm income problem will not rely wholly on the good sense and good will of an urban government but will also encourage farmers to strengthen their own organization for self-help. To do this, he must see politics of some kind and economics as different sides of the same coin.

In 1940, Henry C. Taylor faced up to what he called "groupism" in economics with this recommendation:

> . . . The government should take the lead in developing the rules of the game in the interest of the general welfare, and should serve as the umpire. The means of accomplishing this end is subject matter for intergroup conferences and calls for a high order of statesmanship on the part of leaders in agriculture, industry, and labor, as well as in the Congress and in the White House.[18]

Evidently, both Wallace and Taylor are assuming that farmers would be adequately and effectively represented in laying down the rules of the game. They would no doubt also agree that somebody must see to it that the assumption is valid. Relevant farm economics would include some attention to that task. At the very least, it requires that the farm

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[17] *Ibid.*

[18] Taylor, Henry C., "The Farmer in the Groupistic Regime," *The J. Land and Public Utility Econ.*, Vol. XVI, No. 3, Aug. 1940, p. 261.

economist exercise some choice among the farm politicians in making his services available in the negotiations and discussions.

(5) Distinguish the Double Meanings of "Surplus"

Of the five guidelines offered here for the kind of thinking that will keep farm economics relevant to its main purpose, none is more important than that concerning the meaning of surplus. In the midst of a Feed Grains Program to reduce feed grain production, influential political leaders are saying, "Don't cut food production while the world is starving." One meaning of such a statement is that no surplus exists as long as there are hungry people anywhere in the world. This is entirely different from the farmer's meaning of surplus, which is the amount he cannot sell in his market at a fair price. Under the first definition there is no surplus; under the second there is.

To keep our national policy on supply management from becoming schizophrenic, it is important always to understand for what purposes we use one definition and for what purposes we use the other. To keep the world from starving is not the sole moral and economic responsibility of American farmers. Their culture will encourage them to shoulder their share, but this is a national and international problem, not that of an occupational group. If food is to be produced for donation abroad and at home, the amounts should be budgeted and disposed of in orderly manner. They should not be moved only "to get rid of the surplus."

Underlying public confusion on these issues is an age-old confusion in economic theory—the notion that the only economic value is money value in the market or scarcity value. The fact is there have always been two kinds of economic value—public or use value not measurable in money, and private or scarcity value always measurable in money. Use value is the objective qualities of a good that make it useful for serving human needs; it does not vary per unit with changes in the supply, as does scarcity or market value. It takes a million times as much wheat to feed a million people as it takes to feed one person. But where public policy is to feed people irrespective of their ability to pay, somebody must pay for it.

Considerations like these soon take us far beyond the scope of farm income and price policy and involve us in national and international policy in general. For the farm economist to keep his farm economics relevant in this broader field he must have at least a working acquaintance with national and world economics and politics.[19] But to avoid getting lost in the broader field and even losing interest in the farm price

[19] Among the materials he should read for this purpose is: Ward, Barbara, "Rx for the West: More Confidence, Less Alarm," *The Washington Post*, Outlook Sect. E, Sun., June 18, 1961.

and income problem he needs always to remember the origin of his profession. He must remember that somebody else will need to perform the farm economist's principal role after he has abandoned it to become primarily a general economist.

Summary

Nothing said here is intended to imply that relevant farm economics does not include continued work toward improving the efficiency of the farm firm and the marketing firm. My point is that adequate progress in dealing with the farm price and income problem requires expansion of our work into a broader framework of disciplines and problems. Nor do I deny the importance of the systematic use of economic theory and models, it is only the role they play in the hands of some economists that I question.

It is no accident of history that we call ourselves the American *Farm* Economic Association and our journal the Journal of *Farm* Economics. It is the outcome of a compromise between two different types of economists: (1) Those concerned primarily with the economic problems of farm people, and (2) those concerned primarily with problems of the national economy. Both types are needed, and a good farm economist must first of all be a good economist.

What I have tried to do in this statement is to point out that improvement in the *relative* economic position of farm people is still our dominant purpose and the principal reason for our unique profession. If and when that purpose should become relatively unimportant in our affairs, the chief reason for our existence as a special discipline will have been lost. Meanwhile, in order to keep farm economics relevant to its dominant purpose it must include the kind of thinking needed for the institutional invention recommended by Professor Robbins. As a minimum, this requires an intellectual interest unbound by blind devotion to any single social science discipline. It requires minds that will probe the meaning of freedom, the relation of economics to ethics, and the double meaning of surplus. Finally, it requires the recognition of the need for sympathetic and professional encouragement to farmers in their efforts to organize for self-help.

I have raised again the perennial question as to whether we have done all that is feasible to encourage farmers to develop their own bargaining power through their own business organizations—cooperative, corporate, or quasi-public. Self-help is the private exercise of economic power by an interest group, as contrasted with the public exercise of power by Government. But democratic government itself is a compromise among interest groups. Effective organization for self-help is therefore the best insurance for effective democratic government.

THE "NEW" AGRICULTURAL PROGRAM—FOR BETTER OR FOR WORSE?

CHAIRMAN: D. GALE JOHNSON, UNIVERSITY OF CHICAGO

RESHAPING FARM POLICY IN 1961[1]

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THE new Administration's style and policies have been fairly well established in the past 7 months. On the whole, the New Frontiersmen have not displayed much tendency to innovate; policy on most economic issues, on foreign affairs, and on civil rights is mostly a continuation or evolutionary adjustment of former policy. Agriculture is one of the few areas in which a major departure was attempted. But the main effort to produce a change here has been abortive, and farm policy as of this date is not greatly different from last year—even less from 3 or 4 years ago when the acreage reserve of the Soil Bank was in effect.

By and large, the farm policy the new Administration inherited had been formed not by purposeful shaping by any group with clear ideas of what policy should be, but by the conflicting pressures of diverse interest groups and the impersonal economic forces of the market. As the 1960's began, a strong technological push continued to produce surpluses even though prices had fallen. The Soil Bank and P.L. 480 were mainly responses to stock accumulation. High Government costs and surplus stocks gave strength to the pressure to reduce price supports to nominal levels; prospects of prolonged farm depression if this were done pushed in the other direction. With pressures from many sides approximately equalized, farm policy was a shapeless, inert mass pleasing no one but not sufficiently objectionable to any combination of groups to cause a decisive change.

Misshapen as it was in 1960, however, farm policy had several negative virtues and some positive ones. It did not importantly impede the transfer of excess labor out of agriculture nor retard technological advance in farming. Thus, there was no significant interference with the two principal means by which agriculture becomes a more productive part of the total economy. Criticism of the excess of labor still to be found in agriculture lost much of its force, especially as directed toward *farm* programs, when the limited skills of underemployed farm labor and the persistence of industrial unemployment were taken into account. Net

[1] The helpful comments of Herman Southworth on the first draft of the paper are gratefully acknowledged.

farm income was kept higher than it otherwise would have been. The income transfers from nonfarm to farm people by which this was accomplished probably resulted in a more nearly equal distribution of income in the population and, I venture to say, a higher total welfare. Somewhat too much production was forthcoming, but that is much to be preferred to too little. Probably subsidized exports were less disruptive of foreign markets than free prices for farm products in the United States would have been. P.L. 480 was beneficial, on balance, to other countries, and in its first years it did not absorb many American resources that might have been productively used for other purposes.

On coming into office, the new Administration was thoroughly on record as favoring Government programs, especially control of market supply, to improve farm income. As I interpret Secretary Freeman's actions, he undertook three major things. The first was to assure some immediate increase in farm income. The second was to reverse the 9-year build-up of feed grain stocks. The third was to bring about a major change in the way in which farm policy was made and to broaden greatly the kinds of programs that might be used.

The principal action to raise farm income promptly was to increase support prices for more than a dozen commodities. The feed grain problem was attacked by a program that offered farmers payments for idling corn and grain sorghum acreage. Only participants in the programs could put the two grains under price supports, which were higher than market prices were expected to be. Proposals for major policy revisions were contained in Title I of the Omnibus Farm Bill submitted by the Administration. The bill authorized the Secretary to work out farm programs with advisory committees of farmers; Congress had 60 days in which to reject a program so developed—*not* to amend it—if Congress chose; and, finally, the program was to go into effect if approved in a referendum of producers. The bill authorized the use of national marketing quotas, national or regional marketing orders with or without producer allotments, and direct payments to farmers. It was hoped that the bill would be passed in time to work out a new program for 1962 wheat.

Title I was emasculated in committee. The Omnibus Farm Bill as enacted contained only minor revisions in marketing order legislation. In lieu of broad powers to establish new programs, the Administration was given an extension of the feed grain program to 1962 and a wheat program. The wheat program for 1962 reduces allotments 10 percent, offers growers payments for idling the land representing this 10 percent, and offers higher payments for idling still more wheat land. The Secretary raised the support price for wheat from $1.79 to $2.00 per bushel after passage of the bill.

The new legislation also extended P.L. 480, the Special Milk Program for Children, the Great Plains Conservation Program, and the Wool Act. Some important changes were made in the agricultural credit programs administered by the Farmers Home Administration. Early in the year the Secretary launched a pilot food stamp plan in several small areas over the country.

A convenient approach to appraising accomplishment to date is to begin with the increase of price supports; then to discuss the feed grain and wheat programs as forms of land retirement; next to consider the merits of defeated Title I; and to end with brief comments on other program actions. I shall restrict myself almost entirely to commercial agriculture, by which I mean the 56 percent of all farmers who sell more than $2,500 worth of farm products annually. Admittedly, this leaves out most of the real poverty problem in agriculture. But the problem is barely touched by farm programs. The Administration's policies in such fields as education, medical care, area redevelopment, and economic growth are more pertinent to this problem than are its farm price and production programs.

Price Supports and the Level of Farm Income

Secretary Freeman evidently felt impelled to take action immediately to raise farm income, and it would be naive to assume that usual political motives were wholly absent. In testimony before Congress, he called raising farm income an urgent problem, and he increased price supports for feed grains, several oil crops, rye, rice, cotton, peanuts, dry beans, honey, manufacturing milk, and butterfat. These products accounted for one-fourth of farmers' cash receipts from marketing in 1960. The weighted average increase in support levels was 11½ percent if corn and grain sorghums are included and 10 percent if they are excluded. Some of the products, such as soybeans, were at or above the new support levels because of special, and probably temporary, market circumstances. Was an immediate advance in farm income urgently needed, and was the increase in price support good strategy?

Rates of earnings on farm family labor and investment have been much lower than corresponding rates in industry. The income of commercial farmers, both in total and on a per-farm basis, has been slipping farther behind incomes in the economy at large. Rates of earnings in commercial agriculture have been depressed below static equilibrium levels by the dynamic forces and market structures operating to farmers' disadvantage. Neither the skills required in farming nor equity considerations can be reconciled with persistently lower earnings in commercial agriculture than in most nonfarm lines of business. Thus action to improve rates of

earnings in commercial agriculture is justified so long as resource productivity is not impaired.

But to say that raising farm income is urgently needed suggests that commercial farmers' level of living is below some minimum defined in welfare terms or that farmers' financial position is rapidly deteriorating. Though each is undoubtedly true in many individual cases and drought has hit some areas hard, neither can be demonstrated for commercial agriculture as a whole. Commercial farmers earn low rates of return on labor and investment, but the average family has a large amount of labor and a high investment. Family income in commercial agriculture compares more favorably with nonfarm family income than the comparison of rates of earnings might suggest. Realized net farm income has been approximately stable since 1954, except for the good year 1958, at about 11½ billion dollars. The number of commercial farmers sharing this income did not change much during the period. The cost of living on farms rose 7 percent between 1954 and 1960, but income from off-farm sources also increased. Proprietors' equity in agriculture rose one-fourth in terms of dollar value and remained very high as a percentage of total assets. Income in commercial agriculture in 1960, supported by programs then in effect, was unfavorable, but it was not desperately bad.

The most urgent task before the new Secretary was to reverse the upward trend in surplus stocks of feed grains and wheat. Endless accumulation of stocks simply will not be tolerated. Another pressing problem was to reduce, immediately or prospectively, the Government's cost of farm programs. The old argument that sharing the cost of farm programs through the food bill is regressive, while paying through the tax bill is not, is true but not decisive. Payment via the market is in our ecomonic tradition and is the way industry and labor receive their incomes. More important, however, are the tremendous demands on the budget for defense, space exploration, foreign aid, education, and welfare, none of which have the market as a practicable alternative. From an over-all standpoint, operations that can be financed through the market ordinarily should be so financed. Applying the test of regressiveness to each individual operation in isolation from others is inappropriate.

If surplus stocks and Treasury costs could be reduced in the situation the new Administration confronted, the ground would be prepared for improving farm income. If these things could not be done, the maintenance of even the 1960 level of income was seriously threatened. Farmers had more to gain from bringing surpluses and costs under control in workable programs than from immediate advances in price supports. In raising price supports at once, Secretary Freeman gave away part of the rewards needed later to compensate farmers for production control.

Moreover, he weakened his case with farmers for acceptance of effective controls, for why should farmers put up with such restrictions if price supports can be raised without a change in programs? The Secretary opened the game by leading with a high trump that he should have saved for a later round.

Feed Grains, Wheat, and Land Retirement

The feed grain program, the wheat program for 1962, and the conservation reserve are forms of land retirement, and I shall discuss them together.

Feed grain program

The feed grain program for 1961 is aimed at a really urgent problem and has been a morale-boosting success in getting wide participation among farmers in a production control program of a kind. On these scores it deserves high marks. Programs of this kind can be expected to be subject to certain slippages that cause the reduction in crop output to be less than the number of payment acres would imply. Some of the slippages in the 1961 program might have been avoided if more time had been available to put it into effect. Unfortunately, such slippages, once permitted, probably must be lived with in later years.

The first slippage was assigning to producers acreage bases that were higher than actual plantings in the base period 1959-60. The overrun was about 3.4 million acres for corn and 5.3 million acres for grain sorghums. The second slippage apparently was permitting land to be cropped that would have been idle, fallow, or pastured on the participating farms in the absence of a program. Both slippages were inconsistent with the Feed Grain Act and might have been reduced by appropriate administrative procedures. Probably nonparticipating farmers also increased feed grain and total crop acreages. The June summary of program results showed 26.7 million acres retired from corn and grain sorghums.[2] The July 1 Crop Report, however, showed the acreage of the two crops to be only 19.8 million acres below 1960. The total acreage of 59 crops planted or grown was reduced only 17.2 million acres. The actual reduction of total acreage of all crops amounted to 65 percent of the acreage presumed to be retired by the feed grain program.

The third slippage is expected to be higher yields per acre because of retirement of poorer-than-average land and possibly because of heavier fertilization of land remaining in production. My own calculations suggest that feed grain production this year may be about 22 million tons

[2] Final checks on compliance may reduce this figure. Thus, acreage slippages based on it may be overstated.

less than it would have been without the program. The calculation includes corn for silage and is based on the assumption of similar growing conditions in 1960 and 1961. The estimated decrease is 14 percent of total feed grain production expected without a program.

The lower production of feed grains can be expected to act as a slight brake on expansion of livestock production and to keep feed grain consumption from being quite as high as it otherwise would be. Again on the assumption that growing conditions this year will turn out to be about the same as last, feed grain stocks at the end of the 1961 feeding year may be down about 12 million tons instead of rising by 5 million as might be expected without the program. At this rate of reduction, it would take about 4 more years to get stocks down to 30 million tons, which is a generous carryover.

The payment-in-kind gimmick included in the program does not essentially change the cost to the Government. Very likely, more stocks will be released in redeeming payment-in-kind certificates than will be acquired from growers who put grain under price support. Commodity Credit Corporation stocks are now so high that some of the grain it holds can be considered valueless. Thus the principal cost to the Government will be the acquisition of new grain put under price support. What this will prove to be is a wild guess at the present time, but it could reasonably be 500 million dollars.

If stocks were not excessive and the program were being used merely to hold current production and utilization in balance, the entire amount of the payments to growers would be a cost. Payments will be between 700 and 800 million dollars. This amounts to about $1.00 for each bushel of expected reduction of corn and grain sorghums output. So large a program would not be necessary merely to hold production in line with utilization, and a smaller program could be operated for a lower cost per bushel. But growers have the additional incentive of a higher support price, and this is not reflected in payments. Thus, $1.00 per bushel seems a minimum estimate of what it would cost to hold feed grain production in line with utilization with the present program at present market prices.

One can reasonably anticipate that the reduction in stocks will save storage and handling costs amounting to 70 million dollars a year. If the increase in stocks expected under the old program is considered, the saving is perhaps 100 million dollars a year. If one credits the new program with saving storage costs for 5 or 10 years, the new program looks very good in comparison with the old one. No end to rising costs existed under the old program as it was operating.

Most types of voluntary land retirement programs can be expected to increase the current net income of farmers, because the majority of

growers who participate do so for financial gain. How much the feed grain program will increase net farm income during the crop year, in comparison with the old program, is hard to say. Much will depend on what happens to the market price of feed grains. The gain in net income could be on the order of half of the value of payments.

Wheat program for 1962

The case for increasing prices and incomes before excess stocks and annual production are well in hand is weaker for wheat than for any other commodity. In 1962, wheat growers will get a 12 percent increase in price supports in return for a 10 percent cut in acreage that will reduce output by something less, and in addition they will be paid for temporarily retiring the diverted acres. Growers can retire additional acres at a higher payment rate. Probably market prices will rise to the new support levels. Subsidies on dollar exports of wheat must be increased, and the cost of P.L. 480 will rise if the same volume of nondollar exports is maintained. The plan for 1962 appears likely to increase the Government's cost of the wheat program by a small amount. With average weather and about the present volume of exports, the carryover of wheat should be reduced modestly. The calculated increase in the Government's cost can be converted to a cost reduction if the 1962 program is credited with saving several years' storage.

A larger cut in wheat production and carryover than now established for the 1962 crop could have been obtained without reducing growers' income. One difficulty with requiring a large mandatory reduction in wheat is that the proportionate surplus is much larger in hard red winter wheat than in other classes. Future programs will need to take class distinctions into account, directly or indirectly.

Comparisons with the Soil Bank

The feed grain and wheat programs as set up for 1962 bear a strong resemblance to the *acreage reserve* part of the Soil Bank. The acreage reserve operated in 1956, 1957, and 1958 and was then permitted to die. The only crops making important contributions to the acreage reserve were wheat, corn, and cotton. The 1962 programs will include corn, grain sorghums, barley, and wheat. The land put in the acreage reserve in 1957 and in 1958 when the program was in full-scale operation was only about three-fourths of the acreage for which payments are being made under this year's feed grain program. Payments to growers in the acreage reserve program in 1957 and 1958 were between 600 and 700 million dollars a year.

When both the acreage and the conservation reserve were in operation

in 1957, the reduction in total cropland planted, as compared with 1955 acreage, was 74 percent of the acreage paid for under the two programs. This figure rose to 90 percent in 1958. Both percentages are higher than the one achieved by the feed grain program in 1961. Participation in the corn part of the acreage reserve was handicapped by the requirement that acreage had to be cut below very restrictive allotments before payments were earned, but, as under the feed grain program, only compliers were eligible for a higher support price. At a very rough guess, the cost of reducing corn production by means of the acreage reserve was about $1.00 per bushel. This is the same as the estimate given earlier for the minimum cost of a 1961-style feed grain program operated to hold production in line with utilization.

Costs of operating an acreage reserve or feed grain type of program are high, and they increase sharply if market prices available to nonparticipants rise. This kind of program can be used to support farm income at modest levels, but it is not suited to raising rates of earnings in commercial agriculture to nonfarm rates.

The *conservation reserve* was expanded to nearly 30 million acres after the acreage reserve was discontinued, but no new contracts are now being written. Strong opposition arising from reduced economic activity in areas where large acreage of land has been retired apparently has been the decisive factor in putting the program in mothballs. The program, however, probably has reduced production at considerably lower unit cost than the 1961 feed grain program has done. Data are available on the former use of land in the conservation reserve. I have assumed that the yields per acre on land in the reserve would have been only half of national average yields and that production of crops can be converted to corn equivalents by using their per-acre values. I have assigned to each year one-fifth of the Government's share of the cost of establishing suitable cover and all of the rental payment for the year. On this basis, the cost of reducing production in 1959 was between 50 and 60 cents per bushel of corn. The figure is considerably less if USDA's more optimistic estimates of reduction of output are used.

The conservation reserve tends to withdraw both land and human resources from agriculture at the margin to the advantage of the farm people involved and in the interests of best use of land resources. The program needs to be tightened up and revised in some respects, but its advantages warrant expansion well beyond the present scope.

Title I, the Attempt at Major Revision of Policy

The Omnibus Farm Bill as submitted to Congress was more a proposal as to how policy should be made than a statement of what policy was to

be. The overtones of intent to change the balance of power in the politics of agriculture were strong. Much emphasis was put on powers to control production under special commodity programs or expanded marketing orders, but almost any device ever seriously proposed was to be authorized. The bill suggested less that the Administration had a clear policy in mind than that it was confident it could work something out if given free rein.

The proposal to reduce the role of Congress in making farm policy at least had the justification of a spotty Congressional performance in the past. The Congress has often been reluctant and at times apparently unable to lay down basic farm policy. It has operated on a year-to-year and an emergency-to-emergency basis, often only when prodded by the Administration. At times legislation has been a sort of two-headed monster formed by joining conflicting approaches. Coupled with the failure to lay down basic policy has been the predilection for fussing with details of quotas, normal supplies, the parity formula, and all sorts of exemptions and exceptions. Ideally, Congress should decide broad policy, set forth guide lines for administrative decisions, and give considerable freedom of operation to the Secretary. Congress has an abundance of powers with which to investigate how policy is carried out and to bring about changes if changes are desired.

But the shortcomings of Congressional policy-making are in large part traceable to the conflicts and uncertainties among the people Congress represents. Shifting the site of policy-making powers will not change these. It might very well turn out that policy made by a succession of Secretaries in consultation with advisory committees with shifting political affiliations was even more shapeless than the policy we have had. The proposal would have been more consistent with our governmental processes—though not necessarily more likely to be enacted into law—if it had set forth the policy the Administration wished to follow and had asked the Congress to adopt it as its own.

Supply-control programs will need to be developed in consultation with producers and approved by them before going into effect. Title I was correct in this but was unnecessarily political in designating the advisory committees. After all, the task is not to get together a group who thinks as the Secretary does but to get a program that is effective with farmers. Supply control must be approached commodity by commodity, but Congress should set forth guidelines to require that the total program forms a consistent whole. The omnibus bill as proposed did not even contain the elementary injunction that controls on one crop should not shift acreage to the production of another. Guidelines are also needed by which to decide controversial issues having important implications for

income distribution and efficiency in agriculture. The bill's language as to distribution of quotas among farms was loose, and a deliberately vague statement about family farms implied that, under quotas, production might be cut proportionately more on large farms than on small ones. Efficiency considerations seem to me to require quotas to be neutral with respect to farm size, but the important thing is for Congress to declare itself on such a point.

Other Policy Actions

The extension of P.L. 480, the special milk program, the Wool Act, and the Great Plains conservation program demonstrated the acceptability of these programs but shed no other light on them. The almost uninterrupted rise of wheat exports for foreign currency and the masses of underfed people abroad indicate that it is possible, given time and money, to dispose of tremendous quantities of wheat. Though the cost to our economy in terms of lost production of other goods and services from resources used in wheat production currently is small, this will not be true in the long run. The question of proper balance between food, industrial products, and technical assistance in aid for underdeveloped countries remains an unsettled problem. Probably the answer will be most nearly approached if all forms of such foreign aid are coordinated under one agency.

One other significant move of the new Administration has been the pilot program to test the food stamp plan. This action is long overdue. On the whole, the Administration's approach to the problem of providing better diets for low-income families has been a model of what program development might often be. No extravagant claims were made about what the program might accomplish, and administrative difficulties were foreseen and admitted. When a decision is finally made about the future of the program, far more information will be at hand about probable results, operating procedures, and costs than is usually the case. Some types of farm programs cannot be tried out on a small scale, but some can. There is a general feeling that governmental experimentation on a small scale with economic programs would be vaguely dangerous, but we frequently commit hundreds of millions of dollars to finance untested programs hurriedly put together to meet legislative deadlines.

Climate for Policy Revision

Policy, as the Administration found it, was shapeless and inert because it represented a sort of political-economic equilibrium of many opposing forces whose individual influences were in pretty much of a stalemate. This still has not changed decisively. The presidential election was very

close, and the votes from the farm areas outside the South certainly did nothing to convince Congressmen that the new Administration's farm program had great political appeal. The key men on the agricultural and appropriations committees of Congress remain about as they were, with all their interests and preferences essentially unchanged. The American Farm Bureau Federation and the National Farmers Union switched positions of opposition and support when the Administration changed, but the two farm organizations remain bitterly opposed to each other. The views of Mr. Freeman and Mr. Benson as to what should be done in farm policy and how to do it contrast sharply, but so far this change has not been sufficient to upset the old equilibrium.

The new Secretary has undertaken to improve the farmer's public relations with the public and has had some success. The public should understand that there is indeed a farm problem not attributable merely to Government intervention in the past, that commercial farmers generally are at an income disadvantage, that the productivity of our farms is a great national asset, and that agriculture is adjusting to new conditions. In championing farmers in this respect, Secretary Freeman probably has improved his own public relations with farmers.

Little seems to have been done so far, however, to change farmers' appraisal of the commercial farm problem or to win greater acceptance of the supply controls the Administration favors. There seem to be some shifts in this direction, but they were underway before the election and have continued independently of it. Possibly the Administration has been unwise in not setting forth its intentions more specifically in legislative proposals. The Administration might well have gotten authority to release as much corn as necessary to hold prices at the 1960 levels if it had not left room for suspicion that feed grain prices would be sharply reduced by dumping CCC stocks. Supply-control proposals in the original omnibus bill were so open-ended and vague that, rather than focusing attention on the main issues, they enabled opponents to make control seem the work of the devil—or of two devils.

Possibilities of a Varied Land Retirement Program

Unless the farm situation is greatly upset by external influences, general agreement on a consistent, over-all farm policy remains a long way off. Nevertheless, there may be an opportunity to agree on one basic feature of a farm policy, and that is land retirement.

The view that farming needs some protection from the income consequences of completely free markets is now widely accepted. The hope that surplus disposal programs or promotion will take care of all that farmers choose to produce at livable if not satisfactory prices is not as

strong as it was. Attention has turned increasingly to checking the flow of excess production. Some form of land retirement has been considered acceptable, if not sufficient, by most influential groups. Congress and the Administration have just approved the feed grain and wheat programs for 1962. The Farmers Union and the Grange support them. The Farm Bureau has its own over-all cropland adjustment program for feed grains, wheat, soybeans, and flax. Several nonfarm groups have advocated land retirement programs. The conservation reserve still has considerable support.

There is a possibility, then, that agreement could be reached on a comprehensive land retirement program which, with disposal programs, would be designed to hold the average income of commercial farmers about where it was in 1960. The program would not necessarily be the whole operation on the supply side of the market, but it would be a basic, generally accepted part. The contending groups would agree to disagree on whether quotas and other forms of mandatory controls would be used in an attempt to raise farm income.

The comprehensive land retirement program would consist of three parts: (1) an expanded and revised conservation reserve, (2) programs resembling the feed grain program to reduce production of particular crops or groups of crops that are badly in surplus, and (3) a program to convert land from field crops to hay and pasture. The purpose of the conservation reserve and of the conversion from crops to hay and pasture would be to bring about lasting adjustment of land use in the interests of both farm income and efficient allocation of resources. These programs are too slow-acting and general under present conditions to stabilize markets for all individual crops. Thus retirement of land from specific crops or groups of crops is needed. Since the costs of such programs increase sharply as prices rise, however, use of the programs must be limited to modest income objectives.

The conservation reserve would be a whole-farm approach aimed at the least productive land. The program to convert land from field crops to hay and pasture would be intended to shift land from wheat and other grains to range in the Great Plains. Most of the land so converted presumably would be used for beef. The market for beef is growing sufficiently rapidly to accommodate the slow and probably modest increase of production resulting from the program. Sherman Johnson and Ray Christensen have recently suggested a program along these lines in an unpublished paper. A major revision of the conservation reserve and a feature of the conversion program would be the use of easements or similar devices to maintain the new land use after payments had stopped.

If crop or livestock producers wished to improve their incomes by

mandatory supply control, the means might be provided, subject, however, to conditions that protected the public interest and assured consistency among commodity programs. But whether this was done would be a question aside from land retirement, and controversies about quotas and national marketing orders would not block the development of the land retirement program.

Quotas appear to be needed in addition to land retirement if income in commercial agriculture is to be substantially improved. If quota programs are developed for specific situations in a step-by-step way, they may become a common instrument of farm policy. The Administration's attempt to institute the more stringent forms of supply control was poorly timed and a little inept, but it may well prove to have been in the main stream of policy development rather than in the backwaters.

THE ADMINISTRATION'S SCORE ON THE FIRST ROUND

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THE first part of this paper considers how effective the new Administration has been in accomplishing what it set out to do and where farm policy stands as a result of its efforts. Then, partly because events so far have not been as decisive as expected in January, the second part of the paper turns to the future. Standards for policy are suggested, taking account of the nature of agricultural adjustment problems and of the national and international setting of the problems. Policy possibilities based on the standards are outlined.

Administration Goals and the Play by Play

Grain programs[1]

What alternatives were available to fulfill the publicized objectives for grains of the Emergency Feed Grain Program and the Agricultural Act of 1961? These objectives were (1) reducing the recently growing surpluses of grains, (2) raising gross and net farm income and (3) reducing Government costs. As is well known, the new feed grain program offers diversion payments to farmers who agree to retire 20 percent of their corn and sorghum acreage, and these farmers have the option of retiring an additional 20 percent of acreage at a slightly higher rate of diversion payment.[2] For the 1962 wheat crop there will be diversion payments on a mandatory 10 percent reduction in acreage, and growers may choose whether to retire approximately 30 percent more of their acreage in return for diversion payments slightly higher than on the first 10 percent. Price supports have been raised generally, including a 13 percent increase for corn, a 27 percent increase for sorghum and a 12 percent increase for wheat.

It appears that farmers cooperating in the new feed grain program this year have tended to put maximum permissible acreage into diversion, while noncooperators stepped up their production. Something over 700 million dollars will be paid for diversions of 26.7 million acres of corn and sorghums, accompanied by a net national decline for these crops of only 19.8 million acres.[3] Barring an unexpected combination of yield increase and utilization decrease, feed grain stocks will nonetheless de-

[1] Warren Johnston aided in the analyses appearing in this section.
[2] Barley was added to the feed grain program for 1962.
[3] See Press Release of USDA, Washington, June 8, 1961 and *The Demand and Price Situation*, July 1961, pp. 21-22.

crease with program costs not too far above the Administration's original estimates.[4]

In thinking of possible alternatives for feed grains, difficulties may be noted of striving for similar farm income consequences relying solely on higher price supports. For instance, in conjunction with the likely 20 percent reduction in total feed grain production from 1960 to 1961, the anticipated rise in farm income might have been achieved entirely in the market place by raising support prices on the order of 35 percent above those of last year.[5] This would have meant a not unthinkable price for corn of $1.43 per bushel, which contrasts with the $1.20 support level chosen by the new Administration. An advantage would have been higher Government revenues on prospective stock reductions. However, livestock producers would have been disadvantaged relative to cash grain producers, and the grain price rises might have reduced feed use. Compulsory instead of voluntary participation would have been required. In view of past compliance problems with feed growers, this probably would not have been advisable even if there had been time for the usual procedure of a farmer referendum. As another program alternative, keeping price supports at 1960 levels ($1.06 corn) and relying solely on voluntary diversion payments to achieve the same farm income consequences would have required higher payment for nonproduction possibly leading to an increase in program costs.

Whether the outcome for wheat will be as favorable as for feed grains depends on sign-ups for diversion not yet known. If yields were to remain as high as the 26 bushels per acre indicated for the 1960 crop and if no more than a mandatory 10 percent cut were taken, there would be a 50 million acre wheat crop amounting to 1.3 billion bushels. This is a little larger than recent disappearance which includes unusually high exports. While an unlucky set of circumstances could conceivably permit wheat stocks to continue upward, the expectation probably is for a decline in stocks under the new wheat program.

To compare with possible alternatives, suppose the new wheat program achieves a 20 percent reduction in acreage, cutting production 250 million bushels. This would require 262.5 million dollars in diversion

[4] Compare the figures given in this paragraph with Committee on Agriculture and Forestry, U.S. Senate, 87th Congress, First Session, *Special Feed Program for 1961*, Hearing on S-993 (Washington: GPO, 1961), pp. 8-12. The prospective diversion payments of over $700 million compare with estimates of $400 to $500 million made during the hearings prior to adoption of the program. Almost exactly the predicted acreage reduction was achieved, but greater cooperation accompanied by greater production by noncooperators has contributed to higher costs.

[5] These assumptions give a gross return on the 1961 feed grain crop 8 percent above that of 1960, which appears near expectations. See *Demand and Price Situation, op. cit.*

payments, if we assume payments of 45 percent or $.90 per bushel on the mandatory 10 percent acreage cut and payments of 60 percent or $1.20 per bushel on an additional 10 percent voluntary acreage cut.[6] An alternative achieving the same income and production objectives is higher price supports with no diversion payments. Then it would be necessary for farmers to receive 262.5 million more dollars via higher prices. This would occur with wheat at $2.20 to $2.25.[7] In order to maintain exports an increase in export subsidies would be required. The subsidies would partially but not wholly offset the savings to the Government of the diversion payments. The increase in farm income would come partly from a transfer to farmers from domestic buyers of wheat through higher prices. This program may have been rejected because of the desire not to appear to increase food prices. However, the domestic demand for wheat is so inelastic and the farm value is so small a fraction of the retail value that there would probably be no measurable effect on consumer prices or use. Since the program effect is much more certain than under voluntary diversion and the costs are smaller, this alternative appears to be a strong contender for achieving the same objectives as the program written into law.

On the other hand, an inferior alternative for wheat might be to leave support price at $1.80 per bushel and attempt to obtain the increase in farm income entirely through diversion payments. The Government would have, first the original 262.5 million dollars assumed for diversion payments *plus*, to get the same rise in farm income, increased diversion payments to make up for the $.20 lower price on the assumed production of 1170 billion bushels of wheat or 234 million dollars only partially offset by decreased export subsidies. The costs would thus be higher for a given amount of participation, and the extent of participation would be less certain.[8]

While it can be concluded that the Administration did a good job achieving its immediate objectives, the objectives themselves also need

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[6] That the assumed voluntary cut is in line with administration thinking is indicated by USDA Press Release, June 9, 1961, and Committee on Agriculture and Forestry, 87th Congress, First Session, *Report on Agricultural Act of 1961* (Washington: GPO, 1961), pp. 7-34.

[7] Yield of 26 bushels on 45 million harvested acres gives assumed production of 1170 million bushels. The diversion payments therefore amount to 22.5 cents per bushel (262.5 million dollars divided by 1170 million bushels), the required price rise assumed in the text.

[8] That the alternative of a completely voluntary program like that for feed grains was unthinkable for wheat, is suggested by the strong incentive of wheat farmers in virtually all areas to expand production beyond present allotments indicated in Bailey, Warren R. and Aines, Ronald O., *How Wheat Farmers Would Adjust to Different Programs*, ERS, Production Res. Report No. 52 (Washington: USDA, 1961).

to be scrutinized. There was wide agreement that stock reduction should have high priority. The advisability may continue to be debated of apparently putting farm income objectives so high relative to the objective of decreasing Government costs. The merits of merely holding the line on Government costs or reducing them by a token annual amount do not appear so great when one considers that the recent level of Government cost of agricultural programs is high by historical standards.[9] The new programs substitute payments to farmers not to produce, in place of higher future storage costs implied by previous programs. Keeping the new programs on a permanent basis could entail about a billion dollars per year for diversion payments indefinitely and still substantial storage costs for the 5 to 10 years the programs might take to reduce stocks to reasonable amounts.

Among the three publicized objectives listed at the outset, one would like to see greater cognizance of agriculture's long run adjustment problems. True, for feed grains this year there may not have been time to get legislative approval or put into action a program attractive on a permanent basis in view of the outlook for the feed economy. As the name implies, the Emergency Feed Grain Program passed in March was an urgent measure to reverse the stock build-up This type of consideration is not as applicable to the Agricultural Act of 1961 passed in August (extending feed grain and implementing wheat program). How to relate programs to continuing adjustment problems without undue expense will be a major consideration in the latter part of this paper dealing with the future of farm policy.

The unborn Title I

If the spectacular success of the Administration was the Emergency Feed Grain Program, the spectacular setback was Congress' refusal to

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[9] For one set of program cost estimates, see Joint Economic Committee, 86th Congress, Second Session, *Subsidy and Subsidy-Like Programs of the U. S. Government*, Joint Committee Print (Washington: GPO, 1960), pp. 26-39. A somewhat different method of measuring program costs is exemplified by the Administration procedure as given in *Special Feed Grain Program for 1961, op. cit.*, pp. 8-19 and *Report on Agricultural Act of 1961, op. cit.*, p. 15. Main questions concern how much of P. L. 480 cost to assign to foreign aid and how much to agriculture, and the evaluation of inventory operations as influenced by date of acquisition and date of release of stocks. It would seem desirable (1) to convert dollar outlays and receipts to present values using a discount rate and (2) to compare two situations which are made explicit, say, costs *with* a given program and costs *without* where the "without" situation is made explicit. While neither of the sources referred to in this footnote follows these precepts exactly, there is no question about the dramaticness of rise in costs. The Joint Committee, p. 28, estimates that costs rose from $3.4 billion for 1940-49 to $12.1 billion for 1950-59.

grant the Secretary of Agriculture authority to formulate programs in consultation with commodity groups of his choosing, subject only to legislative veto. The issue was settled when this part of Title I of the Agricultural Act of 1961 was emasculated in committee.

Was there any real chance of its passage? Second guessing makes such factors seem important as the hostility of the Farm Bureau, Congressional discontent with other bodies such as FCC to whom power has been delegated, the President's pre-occupation with foreign policy, and defection of six Democrats on the House Agricultural Committee. The failure may not have been due to any of these specifics. More likely, basic conditions were unfavorable. These include the generally conservative mood of the country, the ambiguity of the farm vote in the 1960 election and the fact that the agricultural sector was not in quite enough disorder to generate demands for a complete revamping of procedures.

The outcome would appear to ensure decisions regarding farm programs will remain firmly with Congress indefinitely. Some have viewed the declining political power of agriculture as evidence that less favorable legislation for agriculture will be possible as time passes. Analysis of House and Senate voting suggests there is no debacle in the offing. In urban areas, the party viewpoint most often rules. This is expected, since constituents have only small and not vital economic interest in farm programs. Because the Democratic party is favorable to high price supports, city Democrats tend to vote for high supports. In rural areas, constituency interest often overrides party influence, i.e., Republicans from farm areas often vote for high supports. This is also expected, since their constituents have vital economic interest. As measured by price support sentiment, in the House over the past 10 years roughly one-third of officeholders can be classified as firmly *pro-* agriculture, one-third *anti* and one-third *marginal* voting about as often for as against high supports.[10] Marginal voters can keep agriculture from writing any kind of ticket it wants. However, the more important conclusion may be that the majority party will be able to continue to exert a controlling influence on the direction of farm policy. The marginal voters tend not to have a vital economic interest and so are swayable by party influence, and the number of them in each party tends to change in line with national election trends. There is little apparent weakening of Democratic sentiment toward support for agriculture, and the present close balance between the two major parties suggests that neither party is going to risk seriously alienating a group that will number millions for the foreseeable future.

[10] These results are from a study in progress by Clair Morris.

USDA reorganizations

Changes for greater emphasis on rural area development include preparations by Extension to establish rural development areas and the setting up of a Rural Development Branch in Economic Research Service. The rural development approach is consistent with pressures for local control and can be commended as being in the direction of aiming to help low-income people. It remains to be seen how much more than industry-hunting can be accomplished and to see how effective industry-hunting can be especially as areas become increasingly competitive. Unfortunately, funds have not become available to mount a large program. The organizational changes have helped to fashion an engine, and now a primary lack is fuel.

The role of economists in USDA has been affected, first by provision for three or four staff economists independent of any agency to be concerned primarily with agricultural programs, a change which should be helpful to the technical competency of high-level decision-making regardless of goals. Second, economics activities have been gathered back together under a Director of Agricultural Economics with two main agencies, the Statistical Reporting Service and the Economics Research Service. Most would agree that challenges accompany the re-grouping. Simply putting economics together is not a cure-all, because any purely research ag ıcy is susceptible to aridity. Moreover, experience is full of illustrations of difficulties encountered when important action problems are investigated. The record of the past few years suggests that funds for economics research would probably be higher in the future if much of the activity had remained as a smaller part of the physical-science-oriented Agricultural Research Service. Against these dangers, besides benefits of *esprit*, with economics independent there is the possibility of more cohesiveness of effort and probably maximization of possibilities for the most dynamic leadership. As only one example of hoped for improvement, in spite of increased research expenditures since World War II, still very little is known about income situations involved in commercial agricultural adjustment problems. Intention to remedy this was recently expressed.[11]

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[11] See *Agricultural Policy Review*, Vol. 1, No. 2 (April-May-June, 1961), pp. 5-7. The foregoing discussion does not try to cover every change under the new Administration. Neglected features of the Agricultural Act of 1961 include: changing minimum acreage and other provisions on wheat allotments, recodification of Farmer's Home Administration loan authorities, extension of the Great Plains program, extension and provision for expansion of P. L. 480 and expanded legal authority for marketing orders.

Where From Here

Biggest issues[12]

There is a widely held view that legislative innovations tend to occur only when happenings build up significant impetus. If the view is valid, the Title I outcome keeping decisions firmly with Congress and the lack of specific events on the horizon making pressure for change favor lack of further major turns in agricultural policy now. An example of future impetus to policy change might be continued corn yield spurts accompanied by a less favorable international demand for soybeans, which could make the costs of voluntary feed diversions unbearable. Another example might be a decision to balance the budget with higher defense expenditures, bringing economy incentives in the rest of Government. However, even more sure than that no such events are certain at this writing is the fact that these and other events bringing pressure on policy could occur at almost any time. Indeed events bringing pressure seem bound to occur at some time in the future. Especially since the Title I outcome means less change this year than was originally anticipated, it may be appropriate to devote attention to possibilities for the time when there is next a major reconsideration of farm policy.

A first question in judging a policy might be: Does it help mitigate suffering associated with agriculture's growth adjustments while recognizing and planning in response to the forces making for change? The question implies an *adjustment philosophy* visualizing a chief rationale for control programs to be difficultly associated with unaided adjustment. It suggests that programs at the same time should focus on important long run goals.

Stating that agriculture has adjustment problems may seem obvious but helps to make clear the reality that there will have to be intervention for some time. Ten years ago during the Korean War there was hope that free markets would generate incomes for farm people commensurate with nonfarm incomes. A modified view now is that if the marginal commercial farmers were forced out, incomes for those remaining would take care of themselves. Even the modified view implies a major policy question of how the forcing out should be accomplished. But prospects for continuation of technological advances suggest that getting present marginal farmers out will not alone guarantee a permanently satisfactory income situation, because in each succeeding year still more farms will

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[12] A longer discussion of issues is found in Tolley, G. S., "Meshing Elimination of Agricultural Surpluses With Other Goals," *Dynamics of Land Use Adjustment: Needed Adjustment* (Ames: Iowa State Univ. Press, 1961), pp. 317-337. While the present section draws on that discussion, here the recommendation is added to follow adjustment philosophy as a more specific guide to program formulation.

become marginal due to ever increased efficiency in face of income-inelastic demand for farm products. The adjustment problems in other words are chronic. Analysis leading to this rationale for agricultural programs does not need to be elaborated further here.[13] An implication being emphasized here is that a more relevant issue than whether there should be programs appears to be what form the programs should take.

The question posed above avoids taking as the central criterion of policy the amount of money going to agriculture. Concentrating on total income leads to danger of programs with blunt even perverse effects within agriculture and tends to ignore whether, if incomes are being helped, adjustment *per se* is also being helped. Lack of orientation to long run adjustment can undermine programs by letting them get out of touch with reality. Accumulation of surpluses several times in the past illustrates how easily this can happen. More and more, urban people unsympathetically view agricultural programs as an unwanted result of interest politics. Programs based exclusively on appeals to help wrest income from the rest of society seem to these people suspiciously consistent with the view. Marginal legislators may be more likely to react favorably to the idea of easing and aiding structural growth adjustment.

A second major question to be asked about a policy is: Does it give enough regard to holding down Treasury expenditures on agriculture? Paradoxically, this question has become more important as the nation grows richer, due to: (a) the significant part of the budget which agricultural programs now comprise, (b) the defense burden, (c) desirability of education and other Government expenditures that are growth-inducing and welfare-increasing and (d) resistance of legislators to raising taxes. The result is that a dollar spent by the Government on agricultural programs may be a dollar foregone in an exceedingly valuable alternative. This suggests leaning in the direction of obtaining revenues for agricultural programs out of the market place by upside bias in level of price support. Such a bias leads to a hidden tax on food, but the loss in consumer surplus is surely small compared to the real costs of Government financing.

A third question might be: Are efficiency goals kept in perspective? The increases in national output to be obtained from correcting marginal resource maladjustments associated with product and factor price effects of programs appear small compared to the continuing contribution of agricultural technological progress.[14] Therefore, as long as programs do

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[13] For a recent rigorous statement, see Schultz, T. W., "A Policy to Redistribute Losses from Economic Progress," *J. Farm Econ.*, Vol. XLIII, No. 3 (Aug. 1961), pp. 554-565.

[14] Walter W. Wilcox among others has emphasized this comparison.

not seriously impede forward shifts associated with new technology, they may be open to only limited criticism from the point of view of efficiency.

It should be noted that one of the costs of the adjustment philosophy mentioned earlier is likely to be a residue of some unpretty inefficient arrangements. Programs lingering after the impetus to them has disappeared may be accompanied by somewhat higher product prices, higher land values and a less optimum location of production than in the absence of programs. Confinement to a framework where only marginal resource adjustment is considered makes these effects seem abhorrent. However, provided the residual effects are held within bounds, a broader perspective may make them appear to be a reasonable price to pay for the short run ease that was made possible.[15]

Concern with efficiency, which has led to emphasis on the land-value and factor-substitution effects of programs, could resemble using a valuable map to find a side road to a destination of questionable consequence instead of taking the main highway to the center of things revealed by the map. That is to say land-value and factor-substitution effects are a manifestation of program influences on factor markets, but even more important factor market influences may have to do with dynamics of adjustments under alternative programs. This provides another illustration of how an adjustment philosophy affects program choice and calls attention to the need for further study of effects of programs on factor market adjustment. As a brief theoretical example, consider a disturbance that creates excess supply. It might be a downward shift in consumer demand or a forward supply shift due to new technology. With a free market, prices fall, and all the producers take low returns until on the order of, say, 5 percent of them are induced to get out. With inelastic demand, the price decline may be severe. Price volatility increases the difficulty of forming accurate expectations, and marginal farmers may hang on for a long while hoping for better times while all suffer from the price effects of the persistent excess supply. Now compare effects of the same disturbance assuming there is a price support program with acreage controls. The initial effect is that stocks begin to accumulate, in response to which acreage allotments are restricted to bring supply back in line with demand. One effect may be to bid up prices of land having allotments, but stickiness of share arrangements will tend to keep relative factor rewards from changing quickly. There may be substitutions of other factors for land, but these reach a limit and a low one in the short run. These secondary effects leave unaltered the conclusion that incomes

[15] For elaboration, see "Meshing Elimination of Agricultural Surpluses With Other Goals," *op. cit.*

will not be adversely affected by price falls, while the less severe income effects of the allotment restriction will serve as a definite signal for marginal farmers to leave. As they leave, allotments can be consolidated leaving farm size about what it would have been, so that a new equilibrium is reached with minimal pain and very likely in a shorter time than with a free market. The foregoing illustrative example does not pretend to establish definitely whether free-market adjustments or controlled adjustment are better. Rather, the example tries to establish that the dynamics of adjustment under different programs may be an important consideration in choosing between them.

The last but most important question to be asked about a policy is: Are low-income farmers helped? Raising productivity of low-income farmers nearer their potential might increase real national product 1 to 3 percent.[16] This, together with justice, gives strong grounds for programs aimed at the group. One can re-state challenges, first, to make sure price-income policies do not make rural poverty worse and, second, to keep trying to devise actions likely to be accepted for amelioration of low incomes.

The remainder of this paper sketches policy possibilities that attempt to provide favorable answers to the above questions.

Wheat and Cotton

Though wheat appears to be further away from equilibrium than cotton, both these cash crops are heavily dependent on export and share a history of being controlled by acreage allotments and marketing quotas. A general direction of policy for both crops might be to monopolize U. S. prices and set export prices not below the resource cost of production. There would then be a self-financing two-price plan, with prices perhaps near present levels. The requirement not to export below cost of production would indicate to world competitors a willingness to compete instead of dump. Exports would not be subsidized by the Treasury, and in line with the previous section the spirit of policies would be to obtain revenue from the domestic market place needed to ease and aid long-run adjustments. There would be prompt, perhaps even mandatory, downward adjustments in response to stock build-ups. No legal minimums on acreage or on other forms of control would impede adjustment, and at

[16] A USDA estimate of man-hour loss associated with underemployment is referred to by Almon T. Mace, "The Rural Areas Development Program," address to New England Agricultural Economics Council, June 29, 1961. An alternative method of estimation, worked out in consultation with Howard Hjort, assumes earnings reflect productivity and bases estimates on increases expected if low-income farmers took alternative employment. This method leads to the same general order of magnitude as the man-hour approach.

the same time there might be less suasion than now against higher prices to help offset income effects of cutbacks.

Efforts might be made to distribute more effectively the incidence of programs through time and among areas. As an example, changes in the level of price support might be coordinated with allotment changes. Suppose stocks began to accumulate indicating need for large cutback. The cutback might be accompanied by a temporary rise in prices with the announcement that prices would be gradually allowed to fall back to previous levels over a 3-year period. In this way immediate adverse income effects would be partially offset, and time would be allowed for farm consolidation and other adjustments with the expectation of the need for these adjustments firmly established.

As another example, acreage cutbacks could be geared formally to human input reductions occurring in different areas instead of tending to be on a purely proportional basis as has been usual practice. For areas where technological changes are impinging rapidly and already forcing large labor adjustment, acreage cutbacks would not be as great as in other areas. The cutbacks might also be tempered according to other conditions such as the proportion of labor supplied by operators and more particularly owner operators, in view of the lack of short run mobility of these persons. Objective, pre-announced rules would be desirable to minimize political pressures and charges of pressures. The reasonableness of the aims of these devices to secure better incidence of programs might help greatly toward winning acceptance of them.

Feed-Livestock output

Virtually everyone wishes to avoid mandatory controls on feed acreage. On the other hand, as a permanent solution, the new voluntary diversion programs have the disadvantage of involving high Treasury costs. Worthy of consideration may be financing voluntary diversions via a livestock scheme. There might be a tax on livestock, at point of slaughter, whose revenues were roughly equivalent to diversion payments necessary to avoid feed grain stock build-up.[17] Or, if there were a problem about taxing one group to pay another group, the Government might go through the motions of acting as a buyer for all livestock and selling at a profit. In either event, to ensure that price effects were passed forward instead of back to the farmer, control of livestock output would be necessary. This might be accomplished via marketing orders with saleable quotas. The fact that most animals are sold makes them more amenable

[17] If diversion payments were used to keep people instead of land out of agricultural production with a homesteads-in-reverse approach, the total program would resemble that in the suggestion for self-financing entry control made in "Meshing Elimination of Agricultural Surpluses With Other Goals," *op. cit.*

to direct control than feed grains. A significant advantage of controlling livestock output would be to help stabilize livestock prices. This should dampen hog- and cattle-cycles and might in other ways make for smoother dynamics along the lines suggested in the earlier theoretical comparison of adjustment to change under control and no-control situations. At the same time, saleability of the livestock quotas would be desirable and perhaps necessary to avoid unneeded interference in some of the internal complexities of the livestock sector.

The foregoing suggestion is subject to the test of working out of many details. Its relative extremeness reflects the toughness of choices facing the feed grain economy. The probability is not negligible that feed adjustment problems will become more severe. This turn of events would make the foregoing suggestion appear less extreme than it does now.

Farmer's Home Administration

The recodification this year raising FHA loan ceilings per farm help adjust to the changing capital structure of farming. Inasmuch as this agency is among the few that has much chance to help low-income farmers it is to be hoped that the Administration will be successful in obtaining contemplated increases in loan authorization funds.

A further possible policy change is suggested by the fact that, while lack of credit is found where there is rural poverty, most agree credit alone is seldom sufficient for a cure. Therefore, the supervision expenditures accompanying loans might be increased substantially. This possibility is mentioned because of a belief that at the heart of rural poverty problems are farmer outlook and management levels. These call for investment in people, of which technical assistance accompanying loans may be a productive part.

Role of the President in farm policy

While the legislative measures in the face of surpluses since World War II have surely eased and often aided agricultural adjustments, the measures have been makeshift and expensive by practically any standard. An advantage of having a fairly strong Executive is that it can be helpful at the occasional times when the interest-group orientation of Congress interferes with effective policy making.[18] Regardless of the

[18] It seems advisable to beware of interpretations claiming that a legislative process is perfect on the one hand or all bad on the other. Certainly not all the effects of interest-group pressure are undesirable, as the pressure after all reflects some people's welfare. Among many reasons why a legislative outcome can sometimes be improved on are: relative lack of representation of unvocal constituents and of objectives such as education which are not vital to the recognized personal economic interest of many people likely to organize. Conflicts among farm interest-groups appear to have made farm policies less well-ordered than if there were general agreement among them as to best approach.

direction of policies that would have been followed, the defeated Title I proposal at least tried to open the door to more effective programs–in the sense of being more pointed–than seem possible within the present legislative process.

Suppose the President sponsored a Title I type of proposal as part of a package that included substantial reduction of Treasury costs. He would say in effect, "Let commercial agriculture keep its own house in order, so long as costs are in hand." The original Title I proposal asked Congress to give up something, offering nothing in return, and so had the appearance of another grab for favors to agriculture. As part of an economy package it would be more becoming and might gather support among Congressmen who are marginal in their views about agriculture. The package would represent a coordination of objectives difficult for anyone to achieve other than the President. Congress cannot be expected to make proposals to give up its power, and the work-day relations of the Secretary of Agriculture would be strained at the least if he had to be the one to originate proposals for less money to agriculture.

Another way in which the President might act according to Woodrow Wilson's instruction to be the tribune of the people would be in pushing for measures aimed at low income farmers. Partly because of the inarticulateness of these persons, other elected officials usually do not have incentive to push for them. Proposed measures might build on the precedent of West Virginia whereby the President has already come to be identified to some extent with steps for those with chronically depressed incomes.

The economy at large

Beneficial reorganization within the Executive might entail USDA having a more active part in monetary-fiscal and other national economic planning decisions. This could include more White House and Bureau of the Budget consultations on these matters with the Secretary of Agriculture and those closely associated with him.[19] Need for greater participation by USDA arises from farm-nonfarm relations primarily on the factor side. Research studies indicate the influence of recessions on farm-to-nonfarm migration.[20] An implication is that there are thousands of

[19] A broader reorganization within the Executive would be to set up a decision-making committee with responsibilities on economic matters similar to those of the National Security Council on defense. See Tolley, G. S., "Need for National Economic Council," *Tar Heel Farm Economist*, May 1961, p. 4. It would be desirable for the Secretary of Agriculture to be on the proposed Council.

[20] See Bishop, C. E., "Economic Aspects of Migration from Farms in the U. S.," and Sjaastad, L. J., "Trends in Occupational Structure and Migration Patterns in the U. S." Both papers were presented at a 1960 Ames conference on Labor Mobility and Population in Agriculture, proceedings to be published by Iowa State Univ. Press.

persons on farms today who would not be there given more continuous full employment in the general economy. In commercial farming areas, there is more pressure on land and other resources than if nonfarm opportunities were more readily available to facilitate long-term adjustments in the agricultural labor force. Depressive effects on farm labor earnings and competition for resources lowers incomes of those who have no intention of migrating. Sluggish nonfarm employment conditions mean more backed-up underemployment on low-income farms, where past high birth rates tend to push people just entering the labor force every year into the nonfarm sector. Automation bringing a relative decline in the demand for unskilled workers is impeding movement of persons redundant to agriculture with little or poor education, of whom there are numbers in the South. Croppers displaced from cotton and tobacco production are often failing to migrate and instead are settling nearby in town-outskirt cheap dwellings taking catch work and in some instances drawing relief. With sufficiently better job availability these persons would follow their relatives cityward where, conservatively, they would double their contribution to national product.

The decision at the onset of the Berlin crisis to raise defense expenditures without increasing taxes could bring full or overfull employment. If so, the decision may turn out to have more influence on agriculture than any other action of the Kennedy Administration.

Also see Ruttan, V. W., "Concepts and Tools for Analyzing Area Development Opportunities and Activities," prepared in connection with Workshop on Extension Educational Responsibilities in the RAD Program, Washington, July 1961.

TOWARD AN INTERNATIONAL DIMENSION

CHAIRMAN: ROBERT C. TETRO, FOREIGN AGRICULTURAL SERVICE, USDA

TRAINING NEEDS FOR AMERICAN TECHNICAL-ASSISTANCE SPECIALISTS ABROAD

W. S. MIDDAUGH
International Cooperation Administration

IN DISCUSSING the "Training Needs for American Technical-Assistance Specialists Abroad" my remarks will apply only to agricultural technicians assigned, or to be assigned, to one of the 60 countries with which the United States has cooperative agreements to give technical assistance in agriculture. Approximately 1,300 agricultural specialists are involved in providing such technical assistance; approximately 900 are direct-hire employees; and 400 are contract employees, and of these, 220 are under university contracts.

The backbone of our technical group consists of career employees who have been engaged in technical assistance work for several years and plan to make a career of this type of activity if their health permits. They provide continuity to the program. During the past year, 139 new employees were hired, 61 of whom were for a regular 2-year tour to fill new and additional requests from cooperating countries and to replace employees who resigned for retirement or other reasons. Twenty-three percent of the 61 new-hires came from USDA, 28 percent from Land Grant Universities and Colleges, and 49 percent from other sources.

The 78 consultants who were hired for short periods—few weeks up to a year—were sought for specific and specialized purposes. Mostly they were people who had a reputation in their specialty, and were borrowed from the university or agency for the short service needed. Thirty-nine percent of the consultants came from USDA, 37 percent from Land Grant Universities and Colleges, and 24 percent from other sources.

Normally, about 200 new employees are needed each year; the current year is not expected to be any exception. About half of this number will be short-time consultants, about half regular 2-year tour people who, we hope, will stay on and make a career of technical assistance.

We have a file of approximately 800 applications from agricultural technicians who desire overseas employment. Most of these technicians are seeking regular 2-year assignments. We still have to search for many specialists because the applications do not come from people with the right qualifications. We are nearly always looking for agricultural economists and irrigation engineers; it seems impossible to get ahead in these two fields.

From universities the question frequently comes to us, "What kind of training are you looking for in a person for overseas work?" Or the question may be, "What courses would you recommend to train for overseas work?" The question is not easy to answer, but we have attempted to in the past and will try again. We ask for no special or different academic training from that required for domestic work. Probably we are even less demanding, for in most of our positions there is less need for a high degree of specialization. Our need is for more generalists with broad background of training. We can rely on short-time consultants for the high degree of specialization when needed. The specialists can appraise the situation and in a few weeks lay out a program of work that will keep a generalist busy for a year or two.

One subject we would like to see emphasized more is the agricultural institutions of the United States—the Land Grant University and Extension Service, the Experiment Station, the agricultural credit institutions, and the cooperatives. Most agricultural students graduate from college without a proper appreciation of what these American institutions mean to agriculture in the United States. The institutions are taken for granted, without appreciation of the effort required to establish them, or of their worth. In as much as the Land Grant Colleges will be celebrating their centennial this next year, students will be exposed more than usual to the history of the institutions. It would be helpful if such information were included in classwork after the centennial.

Another subject which it would be desirable for every new-hire to have had is a foreign language. French and Spanish are the two most needed but the particular language is less important than that the individual has ability in a foreign language. To have good ability, he should have studied it while young. If an individual has ability in one foreign language he can learn a second rather easily unless he is advanced in years. After 40 most people have difficulty in becoming proficient in a foreign language. Since we are an international power and will have thousands of agricultural people overseas for government and private industry, we should get prepared for the future. We surely are not equipped for the present. It has been impossible to find enough agriculturists with French.

A minimum of 3 years of work experience is desired, preferably 5 years. Extension type experience is good because it involves working with people. One has to have a liking for working with people, as well as an ability for it, to be successful in technical assistance work. Some say, "It isn't what you do, but how you do it." While this belittles too much the "what," it does not overemphasize the importance of the "how" a technician conducts his day-to-day working relations with foreign counterparts and trainees.

How the family of a technician is able to get along with other people also is important. We had a lot of family problems until we started interviewing the full family before hiring a new technician. The interview did not eliminate all trouble but it certainly reduced it greatly.

After an employee is hired he is given 3 weeks of orientation. This consists of instruction designed to prepare him for assumption of duty with the agency and for adjustment to living and working overseas. Sizable periods of time are scheduled for each employee to secure specific information about the job he is to do. Part of the orientation for agricultural technicians is given in USDA, and it includes a visit to the Experiment Station at Beltsville. Some of the questions certain to be asked in a foreign country will deal with the Beltsville Experiment Station, so it is advisable for every agriculturist to visit it before going overseas.

A significant part of the orientation consists of using returning personnel to provide firsthand information to new recruits. This is done through personal conferences, recordings, and slide-sets.

All positions are classified in terms of language essentiality. If the position requires proficiency in a foreign language, the employee is given 16 weeks of intensive language training unless he has ability to pass a language test. Language-training is continued on a part-time basis after arrival at the overseas post.

After an employee has completed a tour of 2 years overseas he is granted home leave of about 30 days, and usually he takes some annual leave at the same time. Normally he returns to the same post for another tour of 2 years. Training is sometimes authorized while an employee is in the United States especially after he has been out of the country for several tours. Two types of training are given—refresher and developmental.

Refresher training provides updating of techniques and methods. Normally, such training does not exceed 2 months and includes attendance at workshops, short courses, professional meetings, and consultation with leaders in the employee's professional field. During fiscal year 1960, a total of 30 agricultural employees had refresher training programs, ranging in length from a week to 5 months. The average length of training was 5 weeks. Training was given by universities, USDA agencies, the American Management Association, Department of Interior, State agencies, and private business enterprises such as seed companies and canneries.

Developmental training is given to selected employees who have demonstrated high potential for increased responsibility and broader usefulness to the agency. One of the specially designed programs is the Institute on ICA Development Programming, a 5-month course conducted by Johns Hopkins University. Approximately 20 employees are

included in each course, 4 of which are usually in the agricultural field. The Institute relates the programming of technical and economic assistance to the total environment of a developing country. It has been used to train technicians who have demonstrated administrative potential for positions with management responsibilities, including the chiefs and deputy chiefs of agricultural divisions.

The African Area Studies Program is conducted by Boston University for key personnel who are to be assigned to Africa, especially in countries south of the Sahara, to provide them with an understanding of the environment in which they will be working. During fiscal year 1960, 11 agricultural technicians were assigned to the African Area Study program.

Four agricultural technicians were given other developmental training. One spent the full year at Beltsville receiving on-the-job training to update skills in horticultural research after 16 years overseas. Three spent 7 to 12 months at Land Grant Colleges receiving specific instruction to broaden their ability. One was a young and promising fresh water fisheries expert who was given a year of further training in his specialty. Another was an extension worker who was granted two semesters of regular course work in rural education and comparative Extension. The third was a deputy chief of an agricultural division—he was given 7 months of instruction in agricultural policy, extension organization and methods, and farm management.

We are providing training for about 5 percent of the staff. Another 3 to 5 percent are authorized by their missions to spend 1, 2, or 3 weeks in what we call consultation, to gather specific information required in their jobs. This is not called training for the individual since it is primarily for the benefit of the agency. However, the technicians do receive training during the process.

Finally, a number of employees do make use of their home leave and annual leave to continue work toward an advanced degree. Many more would like to do work toward an advanced degree but cannot arrange enough time to get in a full semester of work while in the United States.

All employees when back in the United States on home leave feel the need for obtaining certain information in order to do a better job when they return. Most of these people gather the information in an independent manner by visiting one or two Land Grant Universities and an equal number of business firms, such as machinery manufacturers. There is splendid cooperation from institutions that provide helpful assistance for our people, who in turn contribute information about the agriculture of the country from which they have returned.

Do all of these various items add up to meeting the training needs of the American technical assistance specialist abroad? The answer is no—definitely not. Earlier I mentioned the desirability for more academic

training regarding our agricultural institutions and a greater degree of proficiency in foreign languages. In addition, we have the problem of our technicians' failing to understand the local people in a foreign country and to get along with them. To a lesser extent there is a problem of their getting along with fellow American co-workers. Your first reaction would be that selection was poor if we did not hire people that had a record of getting along well with their fellow workers. This is not the answer, as we do give this careful consideration, but conditions are different. Overseas, technicans and their families are thrown with the same American co-workers and their families in some way every day.

The situation is different from that in the United States and our people are not all prepared for it. Many are excellent technicians, who need help in overcoming problems; or it may be the wife who has the problem, and that is equally bad. Instruction is needed to prepare technicians and their families for the situations they will face overseas.

Another area that needs attention in the training field deals with factors that motivate change. In tribal society it is difficult for the individual to experiment with new ideas. An individual farm demonstration is not possible nor would it be effective. It has to be a tribal demonstration. The demonstration can be on one farm but you start by getting tribal approval first, and designation of where the demonstration will be. In some areas, agriculture is moving from plantation type of farming to individual family farms. So long as overseers watched operations, production practices were good. Workers were taught the *how* and *when* of the various steps in the production process. But, if no one watched the worker, even after he had been put on a share-crop basis, he would omit every step possible. He knew the *how* and the *when*, but not the *why* of what he was supposed to do. More attention needs to be given to understanding the different cultures and how to motivate the individuals within those cultures.

The type of training needed was approached last year when one of the Land Grant Universities conducted an experimental seminar on social and cultural change. The stated purpose of the seminar was "to present for purposes of discussion a set of sociological concepts which can be used in analyzing the problems involved in introducing new techniques and practices to people engaged in agriculture."

It is proposed to expand the purpose in future such seminars to include psychological and social-psychological concepts to give a more complete picture of the human factors involved in the diffusion of innovations.

The outline for the seminar would include:

1. Analysis of Change

   Reduced to a simplified situation of two people—one individual

interested in conveying a new idea or item of technology to a second person.

2. Social Systems and Social Structure

In general this would cover some of the main similarities and differences in social organization in different contemporary societies.

3. Culture, Culture Traits, and Culture Complexes

Discussion under this heading would center around the analysis of culture in terms of traits and combination of traits and the basic similarities and differences in cultures in different parts of the world.

4. Personality

5. The Individual, His Status and Role

6. Culture and Personality

Culture differences within a society and the relationship of such differences to the acceptance of innovations. Attention would be directed to the manner in which cultural differences and related personality differences affect interaction between an advocate of change and the potential adopter of change.

7. The Change Process and the Strategy of Change.

The proposed seminar of 2 weeks, if it materializes, would be given to all employees while they are back in the United States for home leave. Hopefully, it would hit at the two areas which need most attention—(1) factors that influence change in practices of the individual and (2) an understanding of personality traits so that the individual can objectively do something about correcting his faults which will be pointed out to him before he participates in the seminar. Both phases of the seminar should improve the effectiveness of technicians in training and dealing with foreign counterparts.

Finally, there is another training need of the agricultural technician engaged in technical assistance overseas. We refer to it as a rotation work assignment in the United States. Some of our employees have been overseas for as much as 15 years. They need to have work experience in the United States, but they do not wish to sever their connection with the agency and lose their status in the career service. Also, it is highly desirable for the families of these people to have a couple of years in this country to become reoriented—a particularly important aspect for children of high-school-age.

The Washington office provides rotation opportunities for the maximum number consistent with efficiency of operation. It has been our hope and desire that the Land Grant Universities would work with the agency

in developing a way in which agricultural technicians could have a 2-year work assignment in the United States. If a member of the university staff can be released to the agency for work overseas, it would be a fine thing, and in keeping with the rotation idea, but this phase is not essential.

DISCUSSION: TRAINING NEEDS FOR AMERICAN TECHNICAL-ASSISTANCE SPECIALISTS ABROAD

CARL K. EICHER
Michigan State University

I have benefited from Professor Witt's broad study of the international responsibilities of Michigan State University.[1] In May 1959 Professor Witt relayed his thoughts to agricultural economists in an article entitled: "Towards an International Dimension in Agricultural Economics."[2] Moreover, I have had numerous occasions over the past 6 months to discuss Michigan State's international dimension with administrators and faculty members, including Glen Taggart, Dean of International Programs.

Let us turn to Mr. Middaugh's paper. On the one hand, he states that the ICA has extreme difficulty in securing enough agricultural economists and irrigation engineers. In light of this, I wish that Mr. Middaugh would have been more explicit as to their difficulties when speaking to an audience of agricultural economists. On the other hand, just one year ago Professors Nicholls and Schultz issued a charge of over-investment in agricultural economists. While ICA has continual difficulty in finding agricultural economists, Professor Nicholls stated that our "excess capacity" could be solved by guiding agricultural economists into the international arena, rather than by curtailing the supply of agricultural economists.

Mr. Middaugh states that the ICA answers the frequent question, "What courses would you recommend to train for overseas work?" by saying that the ICA does not ask for any special or different academic training than that required for domestic work. I find this statement inconsistent with his later account of the shortcomings of our present educational system. For example, he states that the following changes should be made in our educational programs:

1. More emphasis on the agricultural institutions of the United States.
2. More emphasis on foreign languages.

[1] Witt, Lawrence, "Towards an International Dimension at Mich. State" (proc.), East Lansing, Aug. 1959.

[2] Witt, Lawrence, "Towards an International Dimension in Agri. Econ.," *J. of Farm Econ.*, 41:220 (1959).

3. More emphasis on what motivates change in traditional societies.
4. More emphasis on preparing technicians and their families for the situations that they face overseas. This implies a better knowledge of the cultural, political, social, and economic aspects of developing nations.

Mr. Middaugh is to be commended for emphasizing these four valid needs. The first need—more knowledge of our agricultural institutions—can be met rather quickly within colleges of agriculture. Since agricultural economics is linked to the broader field of economic development, it is suggested that we take the lead in offering an international dimension to the college of agriculture. I suggest that a graduate course in the economic history of American agriculture will elucidate and help explain the common and variant factors in the development of agriculture and the interrelationships between agricultural development and the general economic growth of our nation. But a word of caution is needed at this point. Professor Kuznets has recently written a provocative article on the past growth patterns of developed nations. He concludes that there are major differences between the underdeveloped countries and the developed countries today in their pre-industrial phase, and that there are much greater obstacles to economic growth in underdeveloped countries than these differences imply.[3] Thus, while a better knowledge of American agricultural institutions and the role of agriculture in our nation's development appear to be immediately relevant to ICA workers and their problems overseas, developing nations cannot be expected always to duplicate agricultural institutions of presently developed nations.

Mr. Middaugh's next three suggestions—increased emphasis on foreign languages, more emphasis on what motivates change, and more emphasis on the culture and political and social systems which technicians and their families will face when they go abroad—call for changes outside of the college of agriculture. To meet these needs, American universities need to build an early international dimension into their undergraduate curriculum. Moreover, an international research dimension implies expanded libraries and administrative solutions to problems of salaries, promotions, and leaves for those going overseas. Many of these changes require additional money. Land Grant Colleges will probably have to secure funds for expanded international work from other than the usual State sources. These and other problems suggest that Land Grant Colleges will satisfy Mr. Middaugh's three needs only after the passage of a few and perhaps many years.

Mr. Middaugh states that they need generalists—preferably those with 3 to 5 years of work experience in Extension. Although work experience

[3] Kuznets, Simon, "Present Underdeveloped Countries and Past Growth Patterns," *Economic Growth: Rationale, Problems, Cases,* Eastin Nelson (ed) (Austin: Univ. of Texas Press, 1960) pp. 17-31.

is valuable, students who study a foreign language in college and then work with American farmers for 3 to 5 years might lose much of their language proficiency.

Now let us turn to a discussion of the various training programs which ICA has established in order to improve their operation. One of the striking findings of Mr. Middaugh's discussion is that only 30 of the roughly 1,300 ICA agricultural workers received refresher training courses in 1960. This figure is less than their annual turnover rate. Only 4 agricultural workers attended the ICA 5-month development training program at Johns Hopkins University, which related the programming of technical assistance to the total environment of a developing nation.

Mr. Middaugh summarizes the current ICA training programs by saying that they definitely do not meet the training needs of their technical-assistance specialists abroad. In this situation, perhaps Mr. Middaugh has understated the level of qualifications of people needed to be recruited by ICA. If ICA raised its employment standards and hired more talented people, this might help solve their training needs. However, if ICA raised its recruiting standards, it might experience even more difficulty in filling its quota of critical occupations such as irrigation engineers and agricultural economists.

We note that the ICA hires predominantly generalists while it engages consultants for short-term assignments. There seems to be little question that a substantial percentage of ICA workers need to be generalists. However, it is suggested that the ICA should establish an applied research branch which will hire researchers to invest in knowledge about the process of economic and social change and thereby help generalists do a more effective job. Although research is no panacea, it is suggested that the balance of ICA effort should be changed to more long-term investment in knowledge about foreign economic assistance, the process of change, and the barriers to change in agriculture. If this change in emphasis were to occur, and researchers were granted somewhat stable career prospects in ICA, then perhaps talented researchers from our profession would ask for employment with ICA just as hundreds seek research employment in the USDA.

Upgrading the staff of ICA, however, is a two-headed problem. The suggestions which I have just advanced are old and familiar to many ICA administrators. We in agricultural economics must appraise the proposition that we should encourage our able people to take overseas assignments. It is frequently stated that there are substantial barriers to reentry into our universities after an individual spends several years with the ICA or other Government agencies. A friend at the International Monetary Fund recently told me that 5 to 10 years work in the Fund or in the World Bank spelled doom to those who tried to move back to uni-

versity teaching and research positions. He mentioned that several friends were able to reenter academia only by taking administrative posts in overseas programs of universities. The noted sociologist Everett C. Hughes suggests that an important aspect of academic morale is the ease of entry and movement from one "academic orbit" to another. He contends that current barriers to movement from academia to business to Government and back to university research and teaching act as important constraints on academic morale.[4]

In summary, I suggest that a substantial number of scholars are more alarmed than Mr. Middaugh about the training needs, and more pessimistic about the prospects for improving the quality of American agriculturists going abroad. The tone of Mr. Middaugh's paper is one of moderation. He offers a passing reference to agricultural economics and to ICA's difficulty in hiring agricultural economists, yet agricultural economists claim that our profession is faced with a supply problem. A relevant question is, "What changes in the structure of ICA operations and what incentives are needed to recruit agricultural economists for overseas work with ICA?"

These and other unsettled issues lead me to suggest that the prognosis is discouraging for rapid improvement in solving the training needs of American technical-assistance specialists going abroad. Our universities have been slow in developing an international dimension. Moreover, it appears that few universities will encourage their first-rate professors to undertake overseas research and technical assistance assignments for 2- to 3-year periods. In light of these difficulties, Professor E. E. Hagen of Massachusetts Institute of Technology suggested at a recent seminar at East Lansing that foreign economic assistance agencies such as ICA can solve many of their recruiting and training problems by replacing their 2-year contract system with a long-term civil service plan which offers both stable career prospects and a guaranteed study leave for a career staff of applied researchers, planning specialists, and generalists.

He suggests that these agencies should establish a "sabbatic in reverse" plan to meet the continuing education needs of overseas workers. Under this plan, an ICA career worker would serve two 3-year overseas assignments with liberal vacation periods, then return to an American university to spend his seventh year teaching, reading, and undertaking research as a full-fledged member of a Department of Agricultural Economics, Department of Economics, or some other department. I suggest that there may be considerable merit in Professor Hagen's proposal.

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[4] Hughes, Everett C., "Non-Economic Aspects of Academic Morale," *Higher Education in the United States*, Seymour E. Harris (ed) (Cambridge: Harvard Univ. Press, 1960), pp. 118-121.

INTERNATIONAL OPPORTUNITIES FOR AMERICAN LAND-GRANT UNIVERSITIES

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RAPIDLY changing times have brought many transformations on our college campuses. The ivory-towered atmosphere that once prevailed in our hallowed halls no longer exists. In the Post-World War II period, student, scholar, teacher, researcher, and administrator have been caught up and enmeshed in what has been characterized as "the new international dimension." If I were a cynic, the manner in which I might measure the degree to which this new dimension has touched the lives of each of us and our fellow professors on campus would be to ask the question, "How many underdeveloped countries do you carry around in your pocket?" The new ferment and affluence of the academic community is readily discernible in the mounting traffic between some universities and the world outside.

I do not class myself as a cynic and, therefore, shall forego the chance to engage in this latest game of faculty club inquiry. Moreover, I feel strongly that the larger role in international affairs assumed by some individuals in our profession has resulted in mutual benefits to our foreign effort and to the academic community. However, I do wish to examine more closely the implications of the new international dimension for our Land-Grant University system. In so doing, I propose, firstly, to examine the general role of the Land-Grant institutions in world affairs; secondly, to discuss their responsibilities and obligations in educational and technical training as an essential part of national, economic, social, and political development; and, thirdly, to explore the unique contribution of the Land-Grant Colleges for systematic research for the forging of new skills in the development assistance process.

Land-Grant University in the World Affairs Setting

Throughout the history of the Land-Grant Colleges and Universities, the needs of American society have guided their development and growth. Of course, the heritage of earlier universities in our Western culture underlies their organization, but the modifications introduced in the Land-Grant institutions were uniquely American. The sturdy tree of American higher education thrust out the branches of research and public service

[1] The author wishes to acknowledge the assistance in the preparation of this paper from Carmen O. Nohre, research assistant, and the critical comments of Elmer W. Learn, Luther J. Pickrel, and O. B. Jesness.

to add to those of resident teaching, and the new grafts appear at times to dwarf and overshadow the older growth.

The development was a pragmatic answer to the needs of a nation pushing back a new geographic frontier, exploiting uncharted natural resources and blending the attributes, capabilities, and limitations of a heterogeneous population into a cohesive society—a nation, if you please, embarking on an era of extended economic development and economic growth. The functional mix of resident teaching, research, and public service has given the American universities an adaptability and responsive philosophy that has resulted in their direct participation in scientific, industrial, and agricultural development. The Land-Grant institutions in particular have embraced this philosophy and integrated it into their concept of the university's responsibility to society.

Historically, the focus of the total educational task has been on the development of the civilization on this continent. With national concern being directed primarily toward dealing with domestic problems, our educational system naturally restricted its attention here. Throughout this period, universities, of course, retained their awareness of their Western heritage and of the international scope of the arts and sciences. However, such a narrow position is no longer tenable in a world of increasing interdependence of peoples and nations. World affairs are no longer the concern of the diplomat and the soldier alone; they involve every citizen.

Concurrent with the increased interdependence of peoples has come the awakening of the so-called underdeveloped areas as evidenced by the rising clamor for economic development. The big mirror that reflects this whole condition into the foggiest corners of thought is the growing disparity in levels of living among nations. In 1959, the per capita income of the three most highly industrialized countries in the world (United States, United Kingdom, and Belgium) averaged over $1,900; the per capita incomes in the next seven strongly industrialized nations averaged about $1,050. At the other end of the spectrum, the income per year in 12 underdeveloped countries, in which over 60 percent of the people were illiterate and over 60 percent were engaged in agriculture, was less than $90.[2] But the astonishing thing is that in recent years the gap is widening, not narrowing. The per capita incomes of people in the industrialized economies have shown remarkable year-by-year growth; incomes in underdeveloped countries have been virtually stagnant.

Growing disparities such as these contribute to the political instability of the world. Moreover, they create situations which are frequently exploited by opponents of the Free World. It is a recognition of these

[2] Hammar, Conrad H., "Economic Growth for Underdeveloped Countries: Theory and Programming" (Mimeographed Paper), Univ. of Minn., June 1961.

threats to our security that as a matter of national policy we are making efforts to meet in part the enormous "rise in expectations" among peoples in newly emerging nations and underdeveloped countries as they aspire to the improved levels of living and to the greater opportunities of the Twentieth Century. In undertaking to close the gap between the "have" and "have not" nations, education is viewed as a vital component of the drive for growth and dignity. Here the overseas challenges to the Land-Grant Universities lie.

However, the university faces a double challenge. First, it must assist our own people to become better informed and to acquire a greater understanding of others. Secondly, it must help the developing economies to establish educational systems which will spawn the intellectual leadership and trained manpower needed.

Permit me at this time to dwell a bit more fully on the first point. What should be the role of the Land-Grant College in upgrading public understanding of international issues? In this regard, there is neither within nor without the academic community full accord on the scope of the Land-Grant system's responsibilities. But surely the role is more than providing information. Without information there can be no education, but the objectives of public education in international affairs are more complex and more vital. In fact, the ultimate goal of education in world affairs is to arrive at a national consensus on major external issues confronting the nation. To achieve this, the education process must produce, firstly, understanding and, secondly, intelligent individual response. Out of the sum of individual reactions, that is, concern and understanding, arise the consensus of which national policies are made. The educational process, then, places in focus the nature and magnitude of the problem, the possible alternatives, and the consequences of a choice.[3]

I believe most of us will admit that events move faster than our knowledge grows. Today this is far more critical than it was formerly. Moreover, in the years ahead, international affairs will lead to further intricate relationships between the United States and the more remote regions of the world. Interdependence, involvement, communications and the number and complexities of problems will become greater rather than less.

The university bears a responsibility to broaden further the horizons of widespeard citizen understanding. Continuing programs of education conducted through adult education services, particularly in the area of world affairs, public affairs, and international trade are important means of achieving this. In fact, the extent to which we succeed in relating the democratic process to the complexities of world affairs may very well be

[3] Nason, John W., "Foreign Policy and the National Consensus," *Adult Leadership*, Feb. 1961.

a crucial factor in determining how new nations move toward or shun that process.

In essence, what I am saying is that one of the university's roles is to combat forcefully what Adlai Stevenson has aptly termed a distemper of our time: human complacence or inertia and apathy.[4] In other words, a true educator will not experience his satisfaction until those who are usually dedicated to the proposition that power and success (affluence) sufficiently fill life's Holy Grail have joined the worriers; and soul-searching (informed concern) has become as respectable in the community's leading civic group as, we hope, in the classroom.

The myopia of our educational system to widespread and significant need no doubt has had many reasons and more than a little justification. In the main, the Land-Grant Colleges have moved quite far beyond the set of responsibilities established by their tax base, that is, State boundaries. However, fiscal problems loom large in meeting responsibilitities and demands in the international area. It cannot be overlooked that such programs, as others, are generally confined to the goals envisaged by the mass of voters and, therefore, held, in terms of educational effort, acceptable to the general mores of our people. As a people, we have not yet arrived at the point where the allocative process places the need of the struggling Indian cultivator in proper perspective with that of the local constituent. Perhaps, this is more idealistic than practical. However, well-conceived public affairs programs can arouse interest and encourage concern over such matters.

Opportunities in Educational and Technical Training

In a gathering heavily weighted with educators, I expect ready acceptance of the proposition that the improvement of human resources through education is among the most effective means of promoting national economic development. It should be recognized that a nation's growth can be more broadly and perhaps, in some instances, even more immediately stimulated by an improvement in educational programs or training institutions rather than by the provision of a new port facility or a new highway. In fact, there is a growing consensus that greatly expended resources are needed "across the board," that is, at all levels of education, in advancing economies. Dr. Schultz will undoubtedly give particular emphasis to the justification for further investments in the human agent.

Here again, however, the Land-Grant institutions have a unique con-

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[4] Stevenson, Adlai E., "America Under Pressure," *Harper's Magazine*, Aug. 1961, pp. 21-24.

tribution to make. The technical know-how in American agriculture always has been shared. But I would argue that the Land-Grant system has more to offer than better seeds, farm practices, or household recipes. In fact, it can contribute to the improvements in the educational philosophies, systems, structures, administrative practices, and curricula of developing nations. In combating widespread illiteracy, it can help meet the needs for expanded teacher training programs at the elementary, secondary, and higher education levels, including expanded practical and vocational training, facilities offering supplementary and "continuation" education at secondary and higher levels, and strengthened basic science education in the secondary schools and universities.

It is not a matter of digging a hole and transplanting our type of educational institution in foreign soil, nor is it a matter of building solely out of local raw materials. It involves a creative synthesis of both. The development of new educational institutions reflects both the socio-economic and technological necessities of time and place. We modify the technology to fit the prevailing attitudes; we modify the local socio-economic setting to make room for the technology.[5]

I stated earlier that we have been active in this type of assistance for over 15 years. During this period, the Land-Grant Colleges have helped train nearly 10,000 foreign agricultural participants in this country under the auspices of the ICA. These visitors and trainees are now coming to our campuses at the rate of about 1,500 per year. Moreover, at the present time, ICA has approximately 1,300 U. S. agricultural specialists, most of them graduates of Land-Grant Colleges, in 56 cooperating countries.

To this must be added the similar exchanges in technical cooperation sponsored by private foundations and agencies. The list is impressive. However, against the claim of those who merely count noses and conclude all is for the best in the best of all possible causes one must balance the needs—and the performance in view of needs appears abysmally meager.

How might the Land-Grant Colleges respond more adequately? How might the international opportunities be more fully realized? Curricula must be revised, or new curricula developed, to (1) better prepare Americans for overseas career opportunities and (2) more nearly meet the needs of foreign students. Particularly regarding the latter, in view of differences in social and cultural backgrounds, in language and personal experiences, colleges can no longer equate the needs of foreign students with those of American students. Some courses should be redesigned to meet the special needs of foreign students. For students working on ad-

[5] Cleveland, Harlan, "The Ethics of Mutual Involvement," Dept. of State Bul., April 10, 1961.

vanced degrees, more effort should be undertaken for study and research dealing with the problems of the students' own countries.

The university staff of those institutions performing overseas tasks directly must be augmented, overseas and campus assignments must be integrated to insure consistency in the long term developmental programs. Not to do so leads to the less desirable procedure of recruiting and hiring overseas staff from outside the home institution on a non-tenure basis on non-regular funds. Under these conditions the total resources of the sponsoring institutions, because of lack of previous working relationship between overseas and institutional staff, are rarely brought into full play.

Administrative procedures on campus and among the cooperating developmental agencies play an important role in recruitment and retention of personnel. The philosophy underlying the lava-like extrusion of administrative regulations does not always fit the philosophy necessary to the morale, *esprit de corps,* and dignity of the overseas specialist. The recognition of continuing professional contributions, the encouragment of promotion and salary adjustments, and the provision for leaves are part of the management problem.

An immediate need is the strengthening of the financial support to cooperating colleges. Some additional support will come from State funds. However, the nation's requirements for help from the Land-Grant institutions will continue to increase. Large sums—larger than in the past —will have to be appropriated at the Federal level. ICA must somehow underwrite the staff augmentations mentioned earlier in selected universities for extended periods of time. This would eliminate sporadic, vexing staffing adjustments, and would permit preparation, planning, and smoother implementation and direction of both programs and personnel shifts. Again, we have had a decade of experience in this area, and it is time we stop trying to solve complex 20-year economic development problems with 5-year economic plans, with personnel on 2-year tours of duty, and with 1-year appropriations.

All in all, a university's participation in overseas activities should strengthen rather than weaken its overall program. The university is not merely a reservoir of high powered talent which can be drawn upon by the government and private foundations. It has a mission and purpose of its own. Under wise management, the university, as a result of its experience in foreign economic development, would expect its usual capabilities to be strengthened. It has a reason to expect an appreciable benefit in the form of more stimulating professors, better informed students, improved curricula, new campus programs and many other influences.[6]

[6] *The College and University in International Affairs,* Carnegie Foundation for the Advancement of Teaching, Annual Report, 1959-60.

Opportunities in Research

In a sense, the entire development assistance program in which our nation is engaged is experimental. Historically, the kind of economic and technological revolution which the less developed countries are experiencing is new. The industrialization of western cultures took place over almost a century; it involved different problems, different technologies and difficult cultural settings than much of the presently underdeveloped world.

Our country's effort to assist advancing economies is also a relatively new one. Much has been learned from the experience of the last few years. But experience in the Land-Grant College system and private industry has taught us that we can learn very much faster, do things more efficiently, and operate more effectively if we undertake systematic research on new problems. For example, it is not uncommon for business corporations to put 5 percent of their total expenditure in research activities. However, our governmental development assistance programs have not, up to this point, supported any significant amount of research to improve our knowledge of how to deal with development problems.[7] The amazing thing about economic development is that the textbooks follow events, not events the textbook.

The role of research in development assistance, as in other endeavors, is to assemble a body of knowledge which is scattered and unevaluated and to use it in a systematic and purposive manner. What research can do is to enlarge the scope and nature of tools available to perform a given task and to clarify and interpret the alternatives among which judgment is exercised and human values brought to bear. Thus, research increases the range of options open to policy-makers and increases the probability that any given decision will have the result intended. Here results would be aimed at raising the yield from funds expended on development assistance.

Many kinds of research are needed. What is the appropriate balance between investments in the human agent and natural resources for selected rates of economic growth? What are reasonable allocations of developmental funds among agriculture, heavy and light industry at different stages of development? What type of land reform induces most ready acceptance of technological advance? What type of socio-political-economic situation is most receptive to the introduction of a farm advisory service? How can savings be mobilized in lesser economically developed

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[7] *An Act for International Development*, Dept. of State, General Foreign Policy Series 169, June 1961.

societies? How can food be used more effectively as a developmental resource? The list is almost endless.

I speak from within the academic groove rather than outside it, but it is my observation that the greatest "new departure" and the greatest intrenational opportunities for the Land-Grant University system in the decade ahead lies in meeting the growing need for research in developmental assistance. In fact, the need for this type of research is just gaining recognition in top governmental circles. At the moment, there are most encouraging signs that things are already beyond the blueprint stage. For example, this past year, the Foreign Agricultural Service worked with three Land-Grant institutions in a review, analysis, and evaluation of market development projects under Section 104(a) of P.L. 480 in the countries of Japan, Italy, and West Germany. Perhaps, more importantly, for the first time in history, an Administration has seen fit to request from Congress in the foreign aid proposal a sum of money designated specifically for research in economic and human development abroad. Under the present proposal, research would become an integral functional responsibility of the newly proposed Agency for International Development (AID), but it is planned that the research be conducted by universities and outside research institutes.

Summary and Conclusions

In appraising the international opportunities of the American Land-Grant Universities, the concept of the role of these universities must be redefined in light of the profound changes that are occurring in the world. The universities themselves are being reshaped, as is indeed the structure of higher education in America. Problems which once were provincial in nature now must be viewed in the context of the world scene. The world is our campus; no longer is the campus our world.

The American Land-Grant system has a long and honorable tradition that the university is not only a teaching and research institution but also one dedicated to performing practical tasks involving a high level of expertness. As such, it is a unique organization of unquestioned competence, adaptability, utility, and power. In meeting the international opportunities of educational and technical training and research, the Land-Grant institutions need to do the job so effectively that the results will transmit to their constituencies—students, faculty, parents, alumni, board of regents, and surrounding community—a sense of creative involvement in a challenging enterprise. The potential for success is there; the potential has hardly been touched. May the full realization of this potential be the history of the second century of this remarkable educational movement.

DISCUSSION: INTERNATIONAL OPPORTUNITIES FOR AMERICAN LAND-GRANT UNIVERSITIES

ARTHUR T. MOSHER
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My comment on Dr. Berg's paper really has two parts. The first is a cautionary note against letting an erroneous concept of the American Land-Grant University and its role get in the way of effective operations in the international field. The second is a group of comments about the nature of the opportunity which international involvement presents, and steps needed if this opportunity is to be utilized.

First, what American Land-Grant Universities have to contribute internationally is due to their being *universities,* not to any mystical superiority as Land-Grant universities. Much too frequently, in their foreign operations, representatives of Land-Grant Universities impute to their institutions virtues that simply are not there. At the least significant level, the name "Land-Grant" is misleading; it has been a very long time since such universities have lived on the income from their grants of land. Second, it is not true (as is so frequently implied) that the United States grants a monopoly on agricultural research activities to Land-Grant Universities. An enormous amount of publicly-financed agricultural research is in the USDA and it is probable that this is equalled in volume by research carried on by private corporations. Third, agricultural Extension in the United States is by no means confined to Land-Grant Universities. It is probable that an equal amount of publicly-financed, out-of-school education related to agriculture and rural life is carried on by Federal and State agencies of a variety of subject-matter types such as soil conservation, credit, rural public health, etc. Fourth, it is doubtful that the Land-Grant Universities could substantiate their claim to carrying on more "practical" research related to "immediate farmer needs" than do other agencies, at least as measured by the types of many research papers receiving top awards by this Association.

What is valid in the Land-Grant University concept in practice abroad is the importance (a) of having enough research engaged in by those doing college teaching to keep the emphasis on what is *not* known and on keeping the growing-edge of knowledge vigorous, and (b) of having the same staff engaged in enough extension to keep its feet on the ground with respect to the real world of farmer problems. This can be done, and it can be urged abroad, without carrying around one's neck the albatross of a fictitious mystique.

But that is secondary.

Let me introduce my second comment by observing that Dr. Berg's paper reminded me of a definition by Dr. Reinhold Niebuhr. "To be good

by grace," he said, "is to be good not by intent or because you want to, but out of the force of ineluctable circumstances."

For the most part, the new international dimension of Land-Grant Universities is being forced upon them by circumstances: a large number of foreign students; the influence of Fulbright and other grants on the use of sabbatical leaves; and the pressure to accept university-to-university relationships financed by the United States Government. Only to a minor degree has it been due to the initiative of the universities, and to an even lesser degree has it been financed out of university tax income.

The *opportunity* for Land-Grant Universities within these international involvements lies in two lessons to be learned from them. On the one hand, we are learning that much of what we had thought universally true was in reality quite provincial and relevant only to the American scene. On the other hand, we increasingly realize that only in the light of what is happening elsewhere in the world can we have realistic programs of teaching and extension to prepare Americans to meet domestic problems successfully.

Dr. Berg used the two phrases "Western heritage" and "the international scope of the arts and sciences." These, he rightly observed, have long been a concern of our universities. Now, in international involvement, we discover that what we have been teaching and learning about our Western heritage by simple description of it as an isolated phenomenon is both expanded and corrected by considering it in comparison with other cultures and with their fruits in economic and political affairs. Likewise, involvement in foreign programs is revising, to a considerable extent, our assessment of "the international scope of the arts and sciences."

Perhaps more than any other single discipline, agricultural economics, as taught in our universities, is provincial to the United States. It takes for granted four sets of circumstances that shape its interests and influence its techniques:

1. Commercial farming, cultivating annual crops, one crop at a time in each field, in an industrial-commercial economy that quickly supplies improved requisites of production in response to new or increased farm demand.

2. A considerable freedom of individual farmers to choose enterprises, methods of cultivation, and types and intensity of capital employment.

3. Occupational mobility, alternative employment, and social security as a State and nuclear-family activity, rather than as a function of the extended-family or local community.

4. The availability and dependability of census, crop, and market information, a pool of trained manpower, and the accessibility of electronic computers.

These features of American agricultural economics show up most dra-

matically as limitations in the training of students from tropical countries. In these latter countries, subsistence agriculture predominates; annual crops and fruit trees of different heights and productive life-spans are frequently grown in the same fields; proportions of different crops in a single field allocate not only soil and water resources but the utilization of sunlight at different heights above the ground; social security is a function of extended-family or community responsibility, and broad social sharing of good harvests in immediate consumption holds ethical priority over capital formation; trained man-power is scarce; purchasable requisites of production very limited; electronic computers usually unavailable, and census and crop information sketchy and undependable.

I am not denying the fact that there are principles basic to agricultural economics which have universal applicability. What I *am* saying is that, in order to be winnowed from the provincial chaff and to be seen as universals, these principles must be freed from the condition of being embedded exclusively, or even primarily, in American conditions and in the current specifics of American agricultural problems. This can only be done by citing examples of the application of universal principles in a variety of different cultural settings, drawn from many parts of the world.

Even in our *domestic* responsibilities, particularly in the field of public policy, we need the correctives that international involvement can supply. We cannot evolve appropriate agricultural policy for any particular American State without:

1. Understanding the facts of life about economic development in underdeveloped countries, including the necessity for many countries to earn foreign exchange by exporting agricultural commodities;
2. Understanding the impact of American domestic agricultural policy on economic development abroad;
3. Assessing the impact of economic development abroad on world supplies, demand, and markets for agricultural products.

These are among the considerations that make *opportunities* out of the necessity for international involvement of our Land-Grant Universities. If we are to capitalize on these opportunities, three developments seem to me to be essential:

First, universities must enter into international tasks with the announced and honest dual objective of giving of as much immediate help as they can, while joining in a mutual search for new insights, new knowledge, and new methodology appropriate to a novel task in a complex setting. It is a corollary of this that only the best of faculty resources are good enough to participate. Dr. Berg made the point that research with respect to the process of developmental assistance may be the Land Grant University's most valuable contribution. I would argue that

this cannot safely be separated from involvement in administering action programs overseas. His point is sound, but it cannot be research *instead of* direct action. It can only be direct action *with* a research objective.

Second, we must eliminate the serious misuse of international programs in which our universities are involved. University contracts, in addition to their substantial valid uses, have been employed by ICA to pass the buck on the difficult task of recruitment for foreign service, to ask universities to undertake tasks abroad outside of their normal functions at home, and, at times, to honor a dogma that foreign aid is necessarily more efficiently conducted by private contractors than through direct governmental programs.

Meanwhile, such contracts have been misused by universities in too many cases:

1. By sending not their better qualified faculty members but those most easily spared;

2. By not sending their own faculty at all, but acting largely as employment brokers, employing outside short-term personnel with no feedback of experience to the home campus;

3. By charging all the traffic will bear as administrative overhead, apparently on the theory that foreign programs are extra and extraneous chores undertaken as a favor (and leading to a counter-move by some ICA administrators to end university contracts as wastefully expensive).

Third, greater effort and better administrative arrangements are needed to integrate the fruits of foreign experience into curricula, professional methodology, and degree requirements on each home campus.

Within certain universities, some of these three developments are now taking place, but in too few; much more is needed among universities to the end that the experience of each can enrich the programs of all.

Is it too much to suggest that seizing the opportunity inherent in international programs is an important element in achieving what has already been claimed in the recent change of the names of so many Land-Grant "Colleges" to UNIVERSITIES?

U.S. ENDEAVORS TO ASSIST LOW-INCOME COUNTRIES IMPROVE ECONOMIC CAPABILITIES OF THEIR PEOPLE

THEODORE W. SCHULTZ
University of Chicago

WE ALL like to play the now fashionable game of economic growth. I prefer the following rules: Each player starts with the same amount of "funds." The object then is to find the *sources* of additional income and to choose those sources that are relatively cheap. If he finds and chooses the largest number of cheap sources, he wins. But this is not easy because most of these sources are dear. If it is his luck to come upon only dear ones, he does not win. When we play this game in the classroom, it is ever so convenient to attach a price tag to each source of income which tells each player precisely how much he would have to pay per $1 of income. But when it comes to real data, the price quotations are often imprecise and some tags are altogether blank. This lack of perfect information, we are told, may add to the fun of some people making real decisions, if they prefer risk and uncertainty. But it makes the classroom game laborious, for it then verges on analysis.

Prices and Sources of Income Streams

We are so accustomed to think only of product and factor prices that I must warn you that I am not referring to these, but to another set, namely, the prices of income streams. Instead of bushels or acres, I am asking you to think in terms of the prices paid for income streams (standard or permanent) measured in monetary units. Thus, the ratio of the price paid to the unit that is being priced is a pure number, say $25 for a $1 permanent income stream. It will be helpful to distinguish between the *level* of all income stream prices and the price of a *particular* stream. Let me relate the level to the state of the economy as follows: as an economy approaches a state of long period equilibrium, the level will approach a maximum, say, in the neighborhood of $25 per $1 of income. But when the supply of these sources of income increases, giving the economy a high rate of growth,[1] the price level of income streams will as a consequence have receded from this maximum, perhaps to a level as low as $10 per $1 of income. Thus economic growth implies events which entail a partial equilibrium caused by an increase in the supply of income streams at prices below the long period equilibrium level.

Whether the price level of income streams is near its maximum or substantially below, the price of a particular source of income may differ from the level that then prevails. Most persons within the economy in which they are situated at any particular time will find, however, the

particular prices of these income streams fairly uniform (adjusting for differences in risk and uncertainty but not abstracting from these).

Natural resources (land). Now and then someone will hit a new pool of oil, or find a 10-foot vein of coal, or some rich ore deposit, and thus acquire additional income cheaply. But natural resources are not among the more promising sources because they have become so small a contributor to national income (only about 5 percent of the national income of the U.S. comes from this source) and because farm land bulks large and good farm land is no longer around for the taking. Of course, there is some land that can be cleared, drained, or irrigated, but surely the Dutch are paying a high price for the little economic growth they are getting from driving back the Zuider Zee and the Italians from developing a little farm land taking it from the Adriatic Sea at the mouth of the Po. More irrigation in India or in California, even though the Federal Government foots the bill, is not a cheap source of additional income. There is, of course, some good land to be had for farming in parts of Latin America and elsewhere, too, that is presently inaccessible for lack of roads which will earn a high return to the investment required to make it accessible.

Reproducible capital goods. Most capital goods consisting of industrial plants, equipment, and inventories are as a rule closely priced, although laboratories and Experiment Stations are priced very imperfectly. The latter occasionally produce a very valuable product but new knowledge refuses to abide by the costs and returns rules of marketable products. Basic research is a venture characterized by many failures and few successes. It is impossible to hold on to new knowledge with a view of selling it for all that it is worth. But some of the successes are exceedingly rewarding in what they ultimately contribute to national income. Hybrid corn has become a classic which, as Griliches has shown, was producing, as of 1955, $7 of national income for each $1 that had been spent on producing it: $902 million of additional income that year from the $131 millions of accumulated past research expenditures.[1] Thus, in developing hybrid corn, instead of paying $25, or even as little as $10 for a $1 income stream, we had acquired each $1 of income coming from this source for only 15 cents.

Human resources. But when all is said and done, the principal source of income is from labor. It is well known that employed people are quantitatively far and away the largest factor of production, about three times as large in what they contribute to production as all the other factors together. (In the United States, natural resources contribute approximately 5 percent, reproducible capital goods 20 percent, and labor

[1] Griliches, Zvi, "Research Costs and Social Returns: Hybrid Corn and Related Innovations," *J. Political Economy*, 67, Oct. 1955.

75 percent of the national income.) But what is only vaguely understood, is the fact that the *capabilities of labor are a produced means of production.* Although it is obvious that people acquire useful skills and knowledge, it has not been obvious that these play a large role in economic growth. Nor has it been obvious that these skills and knowledge are a form of capital, that this capital has grown in western countries at a much faster rate than conventional (nonhuman) capital, and that its growth my well be the most distinctive feature of the economic system.[2] Recent studies of manpower, of the quality of the labor force, and of measures to improve human resources, make it evident that investment in human capital is one of the major contributors to economic growth.

The principal activities that produce human capital are education, on-the-job training, and health services. I would add to these training in the home, some types of training provided by the Armed Forces, adult education, including the activities of our Extension Services, and migration to adjust to economic progress which, too, represents an investment in people.

Except for education, these sources of human capital are virgin land for economic analysis. My efforts to estimate the contribution that education of the labor force makes to economic growth suggest that in the United States, between 1929 and 1957, *at least 21 percent* of the increase in national income came from this source.[3] Even this low estimate implies that education has been contributing as much to economic growth as has the increase in the stock of conventional capital goods.

There are two useful ways of investigating the economics of improvements in human resources. One consists of treating the activities that produce these improvements as an *industry,* and the other consists of treating the relevant expenditures as an *investment* in man. To illustrate, take the activities related to education; we want to know the inputs that are employed, including the time of students (the value of which is the income foregone by students), the "quantity" of the output, and the efficiency with which the transformations are made. Thus education is an

[2] I have drawn here on the introductory paragraph of my "Investment in Human Capital," *American Econ. Review,* LI,'March 1961.

[3] Between 1929 and 1957, the real income of the U.S.A. rose to $302 from $150 billions, an increase of $152 billions. Additional education in the labor force contributed, according to this estimate, almost $32 billions, representing 21 percent of the total rise in national income. See my "Education and Economic Growth" in *Social Forces Influencing American Education, 1961,* Sixtieth Yearbook of the National Society for the Study of Education, Part II, Univ. of Chicago Press, 1961, pp. 78-82, and especially table 18. The only other attempt to estimate the contribution of education to our economic growth of which I have knowledge is that of Edward F. Denison which has been available to me on a confidential basis. His estimate, using a wholly different approach to the underlying data, does, however, give virtually the same result as my estimate cited above.

industry, a $30 billion industry (in the U.S.A.) as large as all of agriculture. Note, however, that whereas agriculture produces for current consumption, education produces mainly producer and consumer capital goods. (Experiment stations can also be treated as an industry.) The products of education and of Experiment Stations may all be used domestically, or some of them may be exported. Then, in studying the formation of human capital, again taking education, we want to identify and measure it, determine what it costs and what the return is to the investment component in education. Human capital also can be exported.

Underinvestment in Human Capital in Low-Income Countries

Low-income countries would of course like to acquire additional income streams as cheaply as possible. When we take account of both the costs of and returns to investments in the capabilities of their people, are these a dear or a cheap source of additional income? The traditional view is that expenditures to improve the labor force have a low priority. Increases in the stock of conventional capital have been rated much higher. The reasons given in support of this view are, however, subject to much doubt. For example, the traditional view holds that education is only consumption and, therefore, the natural order is, first, to develop a more productive industrial and agricultural plant consisting of structures, equipment, inventories, roads, harbors, and irrigation and other installations to improve the land, and then out of the resulting increase in national income, to spend more on education. A country must keep the horse of production ahead of the cart of consumption, so the argument runs, and some history is cited in support of this sequence.

During the early industrialization of western Europe, plant and equipment came first and education followed. Labor was abundant, although mainly illiterate and unskilled. Programs to improve the skills and health of workers were not necessary for this important phase of the industrial revolution. Why are they necessary in low-income countries today? But the analogy is misleading because countries now entering upon industrialization would act like economic illiterates to try to adopt only the simple, primitive, techniques of production of a century or two ago. Nor could they do so even if they were foolish enough to try, because such techniques are now mainly collectors' items, available only in our museums. The abundance of a modern agriculture and industry is not to be had by a people who are predominantly illiterate and unskilled. Education and knowledge are indeed an important variable in the rate of economic growth that low income countries can achieve.

Those who nevertheless hold to the traditional view also stress how few people with a secondary or university education can be employed in

agriculture in any low-income country because agriculture is so backward in such a country and, therefore, cannot employ highly trained people. Much, too, is made of the "unemployed intellectuals" in low income countries, and of the fact that the early large movement of capital from western countries to the then low-income countries was employed to build harbors, ports, railroads, textile mills, and a few factories, and to develop many plantations and not to build and operate schools. Since I have examined these and still other arguments in my Owens Foundation lecture, I shall not burden you with them here.[4]

There are indeed strong reasons for believing that most low-income countries are underinvesting in human capital. These reasons are based, among others, on the contrast between the poor results from our economic aid to these countries compared with the good results from the Marshall program for Europe, on the low rate at which low-income countries can absorb additional amounts of foreign capital for plants and equipment caused by an imbalance from too little expenditures for personnel to operate and manage these new enterprises, and on lessons that emerge from the cross-currents in world agricultural production. In Asia, India, notwithstanding her many efforts to increase food production, is

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[4] "Investment in Human Capital in Poor Countries," a lecture given at Southern Methodist Univ., April 26, 1961 (to be published by the Dept. of Econ. of Southern Methodist Univ.).

A. T. Mosher, in commenting on an early draft of this paper, urged me to state, at least briefly, the arguments developed in my paper for the Owens Foundation lecture, since the paper is not yet published. Let me therefore quote two paragraphs from this paper, as follows: "A substantial literature exists which claims that there are many 'unemployed intellectuals' in most poor countries and this literature goes on to emphasize the social stresses and political dangers inherent in increasing the number who are so unemployed. Clearly, there also are some students who, upon their return from their studies abroad, find it hard to obtain work that will put their new skills and knowledge to good use. Education in this context, so it is argued, is a luxury that a poor country can ill afford. The real issue underlying these situations would appear to be whether the skills and knowledge that these intellectuals and returning students possess are of the type that are useful in economic endeavor and appropriate to the economic circumstances of these countries.

"Still another belief when to invest in people goes back to the uses that were made of the large movements of capital from western countries to less developed countries. This capital was used to build harbors, ports, railroads, textile mills, some factories, and to develop many plantations. It was not used to build and operate schools. It is clear, however, that this capital as a rule increased production substantially. Are there any reasons why imported capital used for similar purposes today will not give fully as satisfactory results? The central issue here turns on who is to run these new establishments once they have been constructed. In general, competent European personnel accompanied these earlier capital exports and proceeded to run the enterprises that emerged. This arrangement is now unacceptable to most of the poor nations acquiring capital from abroad. Who, then, will step in and run these new port authorities, power installations, railroads and, above all, the many plants equipped with modern machinery? The lesson to be drawn from recent experiences clearly indicates that it is much easier to build and construct than it is to develop qualified people to operate and manage such establishments."

not doing well, whereas Japan with two to three times as dense a population and relatively much less land for farming is expanding her food output rapidly, becoming, of all things, self-sufficient in rice last year. Similar perplexities are to be seen in Latin America and throughout Europe, including Israel. Those countries that have the best records have not won them because they have the best land, or mainly because they have increased rapidly the reproducible capital in agriculture, but largely because they have acquired the skills and knowledge required, and a confidence in their ability to develop a modern agriculture. These capabilities would appear to earn high dividends at home and abroad under present circumstances.

Our Endeavors to Assist Low-Income Countries Improve Their Human Resources

The question here is: What are the (efficient) means (meaning here countries who want us to join with them in some of these endeavors and whom we want to assist in these ways)? I propose, first, simply to list such means and then to comment on their possibilities in light of experience and underlying economic factors.

A low income country can either import particular skills and knowledge or she can produce these at home. There are, in turn, two ways of importing, one by inducing foreigners to come and offer their skills, the other by having some people go abroad to acquire a command of these skills and then return. Thus to import, firms, persons and the Government in such a country may employ foreign engineers, economists, and others from abroad who have the skills they are seeking. Some foreign itinerants who are already well shod may be invited to come for a couple of weeks or months mainly for prestige. There is also a class of light work-horses who can be had for a year or two of service.

The second way of importing these skills and knowledge is to have a select group of people go abroad and master these capabilities. Such individuals may go abroad, say to the United States, as distinguished members of a special mission hopping from place to place absorbing, who knows what, through ill-prepared and overworked interpreters. Some of those who go abroad may settle down for a spell either to learn from on-the-job work or from enrolling for instruction and research. Thus, in short, a low-income country can import human capital from us by employing Americans or by having some of her people come to the United States for training and instruction.

The other source of these skills and knowledge open to a low-income country is from her own production. The United States might assist in financing and in organizing such endeavors and temporarily furnishing some personnel, but these endeavors would be essentially indigenous.

With no intention of taking an Olympian stance, an economist's critique compels one to say that there are major shortcomings in what is being done in this area by us and by most low-income countries. It must be said that too much stress has been placed on importing and too little on producing the required skills and knowledge within the particular low-income countries; that too many crash programs and too few enduring enterprises have been undertaken; that too much attention has been given to activities at the university level and all too little to developing elementary and secondary schools within these countries; that the training and instruction offered to foreign students in the United States has been too specific to the demands for skills and knowledge of our economy and, thus, too remote from the demands for such capabilities of the economy of these low income countries; and, lastly, that it is a mistake to separate programs for education from programs for economic development.

Import or produce at home. I am of course aware that low-income countries differ greatly one from another with respect to the circumstances that bear on this issue. Like the gains to be had from trade, it all depends upon the relative endowments and capacities expressed in the relative prices of factors and products. Nor is it necessarily either one or the other as a rule, for both imported and home produced skills may be advantageous, each serving different skill requirements. No doubt Mexican nationals working in the United States gain much from the on-the-job training that they acquire. Meanwhile, many higher skills can presently be had by Mexicans more cheaply at home than abroad by attending one of their technological institutes.

Our governmental endeavors consist predominantly of exporting, that is, in sending Americans abroad to advise, to instruct, and, in a few instances, to undertake research for the country concerned. In 1959-60, there were nearly 50,000 foreign students studying in institutions of higher education in the United States. Only 1,600 of these were studying agriculture.[5] It is not that this is too large a number, for there are a number of other countries in which the proportion of foreign students to total enrollment is much higher than in the United States (less than 1 percent in the United States compared to six European countries enrolling between 4 and 30 percent),[6] but what is serious is the relative neglect of developing institutions for this task in these low income countries. Unlike some of our foundations, the governmental agencies have neither the authority nor the capacity to assist low income countries develop efficient centers for instruction and research. Let me illustrate

[5] Holland, Kenneth, "Who Is He?" *The Annals of the American Academy of Political and Social Science,* May 1961, pp. 10-11, Tables 1 and 2.

[6] Platt, William J., *Toward Strategies of Education,* Stanford Res. Institute, Calif., 1961, Table 1.

what I mean. The Rockefeller Foundation has achieved a notable record, first in Mexico and now also in Colombia (and it is adding to this list), in making it possible for these countries to produce their own corn breeders and other scientists to serve agriculture. Meanwhile, our Government has spent many times as much on agricultural work in Latin America without developing a single first-rate agricultural research center. It is noteworthy that Dr. J. George Harrar, who directed the Rockefeller Foundation in this endeavor, has now been selected to assume the presidency of this great foundation.

Where, one must ask, have our university-to-university arrangements been successful in developing first-rate centers for instruction and research? There should be a substantial number of them by now, but there are few,[7] mainly because we have failed to set our hand to achieve this objective. ICA and our universities have not put themselves to this task. As a consequence, after years, and with 100 ICA-financed university contracts in operation (Dec. 31, 1960),[8] these low-income countries are still importing, and as far as one can see on ahead, will have to continue to import all too many of these skills for their economic endeavors.

Crash or enduring programs. One of the principal reasons why Government programs have done much less well than have those sponsored by foundations, is that our Government has been committed mainly to crash programs. While there are always some needs that arise unexpectedly which call for a quick, short program, the basic requirements of low-income countries consist of skills and knowledge that can best be provided by well conceived, enduring programs of education and research. A few quickly trained mechanics to repair automobiles and trucks, or to overhaul this or that machine, or a small corps of individuals to drive tractors, keep accounts, or operate oil presses, will not fill the bill. Puerto Rico, it might be noted, has done exceedingly well in developing for herself the kind of schools and institutions that many a low-income country requires. Where has the United States assisted a country to develop the counterpart in this respect of what has emerged in Puerto Rico? I know of none.

Distribution among levels of education. There is, I am convinced, a profound bias, both on our part and on the part of leaders in many low-income countries, against programs to extend and improve elementary and secondary education. We have put most of our money on public health, agriculture, engineering, industrial productivity, public and business administration, and some trade schools and vocational training.

[7] A. T. Mosher would rate the Cornell enterprise, Los Banos, in the Philippines high on this score. At the danger of appearing presumptuous, I would give the Chicago Chile enterprise a good rating.

[8] See, American Council on Education, *The Role of American Higher Education in Relation to Developing Areas*, Washington, D.C., 1961. Appendix lists each of these contracts.

Grants and aids to students of these countries to make it possible for them to study in the United States have also favored these areas of specialization. Surely, we and they have been very short-sighted in the neglect that this emphasis implies of elementary and secondary schools. Taking a long-period view, as one must in investing in human capital, the really large pay-offs are likely to be precisely the areas that have been so grossly neglected.

It is not amiss to note that in the United States our Land-Grant people have also given all too little attention to the wholly inadequate elementary and secondary education available to the children of many of our farm families; consider only the large number of farm people who are semi-illiterates, because they have had only four years or less of school, and consider how difficult it is for most farm people to acquire non-farm jobs except in unskilled occupations that are rapidly shrinking. Let me note, also, that one of the strongest arguments for land reform throughout some parts of Latin America is in the fact that it could become a means of getting farm people out of the illiteracy trap in which so many of them are caught.

Misplaced specificity in human capital we export. The error here is much discussed but what we do to correct it is far from the mark. When students from low-income countries enroll in the United States, more often than not they acquire skills and knowledge that are appropriate to our economy rather than to the circumstances that will confront them when they have returned. Instruction in our agricultural colleges would support this inference as strongly as any area of specialization. Most agricultural instruction, including most of agricultural economics, is short on general principles and long on the specific properties of agriculture of the state or region in which the institution is located. U.S. missions abroad, aware of this shortcoming of so much of college instruction, have countered by requiring some of the students they support to go from institution to institution; but this is worse still, for such rolling stones gather no moss whatsoever. We could and should improve our instruction, for in doing so it would become much more valuable to our own students. The conclusion that emerges, however, bearing on the issue at hand, is that as soon as possible such instruction should be acquired within the low-income country concerned.

Connection between investment in things and people. The logical basis of this connection rests on the concept of an optimum allocation of resources available for investment not only among capital goods but importantly also between such goods and the capabilities of people. Formally, this concept provides a standard for investing so that there will be neither over- nor under-investment in things or in people. But there is all too little awareness of this important connection in the way our government

organizes and administers programs to assist low income countries achieve economic growth.

We are, however, held by the dead hand of the past which causes us to place educational matters in one compartment and economic development in another.[9] They are thus separated in Washington and it follows, of course, that the same separation is established in our missions in foreign countries. Bureaucratic fences are built to protect each from the other and, as a consequence, investment in people is to be found in no man's land between the two fences.

A capable people are the key to the abundance of a modern economy. They are a major source of economic growth. The game of economic growth is neither interesting nor rewarding if we neglect improvements in skills and knowledge of people and the confidence that go to make a people more capable.

DISCUSSION: U.S. ENDEAVORS TO ASSIST LOW-INCOME COUNTRIES IMPROVE ECONOMIC CAPABILITIES OF THEIR PEOPLE

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I find it a great pleasure to discuss Professor T. W. Schultz' paper appraising the U.S. program to develop the economic capabilities of the low-income countries. At a time when world chancelleries are closely watching the performance of American aid programs, the point Professor Schultz raised is crucial: that we are getting "poor results from our economic aid to these countries compared to the good results from the Marshall program for Europe. . . ." The difficulty, he argues, stems from an imbalance brought about by our traditional preoccupation with the physical factors of growth, neglecting the concomitant development of the human factor which is clearly a technical complement.

In recent years, we have found it necessary to undergo "agonizing reappraisals" militarily and politically in our cold war strategy; now Professor Schultz asks us to reappraise our economic programs. Hopefully, I trust this can be done with less agony than we suffered in our military and political reappraisals. Before attempting to reappraise Professor Schultz' reappraisal I should like first of all to say a few words of praise for the important work he has been doing in the field of human investment and economic growth.

Some of us now and then hit upon a seminal notion. But few appear

[9] I recently prepared a brief memorandum for a Panel in the Dept. of State on this issue, under the title "Human Resources as an Organizing Concept," Econ. of Education Res. Paper No. 64-4, June 7, 1961, Univ. of Chicago.

to have the conviction and determination to see it through. Economic development literature is full of notions—the more sophisticated ones are known as models. Yet, seldom does one come away with any feeling of balance. And if one looks at available input-output time series on national economies, one gets a decided impression that where emphasis on specific growth factors do emerge they are misplaced. Thanks to his uncommon insight and fertile imagination, I believe Professor Schultz has once again taken hold of the really crucial factor that underlies economic growth. More important, he acted as if he believed in his notion, as is clear from his prodigious writings on the subject in recent years. In doing so, he succeeded in altering our focus and in providing us with plausible numerical estimates of the contribution of human investment to economic growth.

On the process of growth, Professor Schultz has this to say: "Thus economic growth implies events which entail a partial equilibrium caused by an increase in the supply of income streams at prices below the long period equilibrium level." I find this notion useful as well as interesting. And I should like to enlarge upon it a bit. I take the following to be true: (1) The supply price of an income stream is derived from the cost of the productive services which generate the particular income stream. (2) By the long-period equilibrium, we mean a state in which there is zero growth. (3) As the economy moves toward the long-period equilibrium, successive acquisition of additional income streams, under conditions of given production possibilities and diminishing returns, exhaust low-priced streams, leaving at the margin streams commanding increasingly higher prices. The long-period equilibrium prices are reached when prices are so high that the discount rate (Keynes' marginal efficiency of capital) required to bring the present value of the income stream in line with its price is equal to the interest rate yielding a volume of savings sufficient only to replace the income streams that are being exhausted.

When so interpreted (and I hope the interpretation is correct), the notion sounds almost traditional. And if one allows population growth, as a source of additional income streams, to be exogenous (i.e., not subject to rational cost-benefit calculus), he has the Malthusian proposition. In this case, population growth leads us beyond Schultz' long-period equilibrium. Some economic growth (increase in total income) occurs as a consequence as long as population increment leads to a positive income stream (i.e., positive marginal labor productivity). Population growth ceases only when per capita income falls to subsistence. Actually, the novelty of Schultz' notion lies in the new meaning that the word "savings" implies. Once we push the definition of capital and investment beyond the traditional confines, what was once regarded as consumption

becomes part of savings or investment. Schultz stresses that outlays (including income foregone) for the formation of human capabilities fall in the investment category.

From the above, it would seem that Schultz' long-period equilibrium rests on the assumption of rational cost-benefit behavior. Apart from population growth, there are other instances where the addition of income streams is not so governed. Where cost-benefit calculus does not govern, either underinvestment or overinvestment appears. Schultz argues that in human investment we have a case of underinvestment. This would seem odd at a first glance, since human investment may well continue indefinitely, albeit at a low rate, under Schultz' long period equilibrium as long as it is popularly regarded as consumption. Overinvestment would then obtain as a matter of course. However, this is the result one expects under particular "static" settings only.

In passing, let me note that empirical findings in one of my earlier studies of Southern economic development are fully consistent with this expectation.[1] The point is also fully recognized by Schultz when he supplies a rationale for the British neglect of human investment during the Industrial Revolution. In today's realistic settings, production possibilities, among other things, are not given but changing. Also turning to the low-income countries, we see great gaps between the techniques in use and those that could be used, *provided certain necessary complementary ingredients were there.*

Schultz argues that a key ingredient is human capability and that it is not there. Had it been there, these countries would be in a position to exploit the new income streams at drastically reduced prices. This is saying that expanded income streams could be had from the same resources. When all is said and done, I have no disagreement with Schultz that *this is the essence of economic growth* and the hope of the low-income countries characterized by stringent physical resources.

As a matter of fact, I would still be in agreement with him had he added that improved human attributes are more than a technical complement and that they can be a prime mover as well. Just as western railroads in this country were wisely built ahead of demand to induce U.S. regional development, so should human capabilities be developed before existing settings can justify the move. After having spent one year in Japan, I am all the more convinced on this point.

Japan pushed rural education (beginning with the Meiji Reformation of 1868) at a time when traditional agriculture could ill justify the outlays even if the Government had thought of education as an investment. But the payoff has been handsome. As my recent study indicates,[2] Japa-

[1] Tang, Anthony M., "Economic Development and Changing Consequences of Race Discrimination," *J. Farm Econ.*, Dec. 1959, pp. 1113-26.

nese net real farm output nearly tripled during 1880-1938 while inputs rose by only some 30 percent. The findings, though still somewhat tentative, show the following: (1) Some 70 percent of the variance in the unexplained output (i.e., that part left unaccounted for by changes in inputs) can be attributed to rural education and research, development, and extension in agriculture. (2) An investment of $1 in these areas in the long run brings a total *social* return of some $9 implying a marginal efficiency of roughly 40 percent under the estimated distribution of the income stream over time.

Professor Schultz includes many dimensions when he speaks of human capabilities. Thus, any increase in the *level* of education, skills, and health of the labor force is an aspect of human investment. While skills can be acquired through formal training, I am tempted to agree with Professor Leontief that skill formation is primarily a by-product of the technical progress embodied in the production processes in use. It is difficult for me to visualize the training of a labor force to rival that of the U.S. in skills by means of classroom lectures and scale models. This is of course one of the bases for the oft-repeated argument that it pays the low-income countries to indulge in technically-advanced undertakings (usually, capital-intensive) for the sake of skill formation.[3]

I shall close this discussion with two more brief remarks. The rates of return to education to which Professor Schultz referred include in their denominator the imputed income foregone by persons receiving education. Opportunity cost of labor furnishes the basis for his imputation. In underdeveloped settings and in rural districts where the school year is tailored to fit agriculture's seasonal labor requirement, the opportunity cost may well be negligible. In such cases, Schultz' use of market wages in the imputation procedure may greatly exaggerate income foregone. For similar reasons, I have a feeling that the cost of land reclamation in many cases may not be nearly as high as he claimed in his paper.

Finally, I am sympathetic with Schultz' criticism of America's lopsided emphasis on exporting knowledge where an important form of export consists of inviting distinguished foreign groups to tour the U.S. It may not be amiss to suggest, however, that the U.S. government is not guided by a single objective and that influencing future foreign leaders—and this can best be done by giving them a feeling for the country and its people—may be an equally important goal.

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[2] "Research and Education in Japanese Agricultural Development, 1880-1938" a paper read before the annual meeting of the Econometric Society, August 1961, held at Stillwater, Okla.

[3] However, I do not share this view in its extreme version. As long as any economy employs means of production of varying degrees of technical sophistication, it would be reasonable to seek to upgrade the skill level gradually by advancing from less technically advanced industries to the more advanced.

SIGNIFICANT CHANGES IN FOREIGN AGRICULTURE SINCE 1945

CHAIRMAN: HOWARD DIESSLIN, FARM FOUNDATION

PLANS OF AGRICULTURAL DEVELOPMENT IN INDIA

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WITH respect to employment and also to proportionate contribution to the national income, agriculture has always been the single most important economic activity in India. Till recently, however, agriculture was largely conducted as a means of raising subsistence crops, and the approach of the farmer towards his cultivating practices was more that of a way of life than that of a business. Under the impact of a broadening market and of a general industrialization of the country, agriculture is being drawn increasingly within the orbit of competitive forces of investment and profits. Since the introduction of a policy of planned development in 1951 agriculture has come to occupy an important place in the pattern of economic growth. For the supply of food and industrial raw materials—a rapidly increasing demand for both is forecast—as also for eventually supplying a surplus of net income which may help to finance nonagricultural development, great reliance is being placed on programs of agricultural development included in the Five-Year Plans of the country.

First Plan Period

The first Five-Year Plan, 1951-56, was mainly concerned with repairing the damage caused to the agrarian economy by World War II, and by the partition of the country. Some of the tasks that had first to be attended to were resettlement of displaced families, reconditioning of irrigation systems, and replenishing exhausted stocks. But over the whole country a vigorous movement intended ultimately to initiate a major technological as well as social transformation was set in motion. In providing the economic and organizational base to the Five Year Plans, the community development and national extension service were mainly concerned with bringing about a vigorous transformation of rural society. About 15 percent of the total public outlay of the First Plan was devoted to agriculture, community development, and cooperation. A large part of the benefit of the major hydroelectric schemes (for which over 16 percent of plan funds were being used) accrued to agriculture by way of irrigation facilities. The full benefit of all these measures could be

expected to flow only in the course of time. But even by the end of the First Plan period (1955-56) agricultural production had increased by 17 percent over the basic year 1949-50.

Second Plan Period

During the Second Plan period, 1956-61, more funds were provided for agriculture and community development, Rs.568 crores (1 crore = 10 million), as against Rs.357 crores in the First Plan. The proportionate share out of the total plan funds represented by this amount, about 12 percent, was, however, smaller than in the First Plan. Industries, mining, and transport claimed a higher share. In part, these constituted both added demand and support for agriculture. As a result, by the end of 1958-59 the agricultural production index had increased to 132, food grain production for the year being 75.5 million tons. The production of food grains during 1960-61 is expected to range between 76 and 78 million tons. A recent official announcement has put this figure nearer 80 million tons. This order of progress is significant but not yet very striking as indicating a stage of critical transformation of the rate of increase in productivity in the entire agricultural economy. Incomplete utilization of irrigation potential, shortage of chemical fertilizers and under-utilization of local resources of organic manure, and slow initial progress of seed multiplication farms were some of the shortcomings in policy and organization which came to notice as the Plan advanced. The Third Plan seeks to benefit from these lessons of experience.

Third Five-Year Plan

Objectives

The increasing demands made on agriculture by growth of population and urbanization, as well as by the further stages of industrialization of the economy, have to be more satisfactorily met. Food self-sufficiency and fuller agricultural employment continue to be major objectives. In perspective, the broad outlines of plan policy are that by the end of the 5th Plan period, or at the latest the 6th, the per capita income of the agricultural population should be doubled. It is intended that agricultural production should show a steadily increasing rate so that by the year 1975-76, that is, by the end of the Fifth Plan the index may touch 300, as against 117 in 1955-56, 132 in 1958-59, and about 135 in 1960-61. Corresponding increases in consumption are indicated by an increase in per capita consumption of milk by adults from 4.5 ounces to 10 ounces, and of cereals from 2,000 calories to 2,600 calories. The farmers' own organizations are to be helped to maximise their efforts so as to reach these overall objectives.

Targets

It is natural to expect that with diversification of farming and with the general rise in the standards of living, the cereal component of the food needs of the country will diminish. But for the Third Five-Year Plan period, 1961-66, it is estimated that the needs of the population will amount to an approximate figure of 100 million tons to be reached by the year 1965-66. If this end is achieved, imports of food grains in normal years would not be necessary. During the First Plan period agricultural production increased at the rate of 2.8 percent a year. The corresponding rate estimated for the Second Plan period is 3.1 percent, and if the targets mentioned above are to be reached it will have to hit about 6 percent in the Third Plan period. Besides food grains, other important crops are sugarcane, oil seeds, cotton, and jute. In respect of these crops and a number of other minor cash crops, increases in production by the end of the Third Plan period are intended to meet the requirements of industry and exports. It is realized that to attain these results, besides a general improvement in productive organization, intensive efforts in areas of high potential are called for. Pilot districts, one in each state, have been chosen for the introduction of a package program of all-out augmentation of necessary inputs, including organizational effort. The results of these pilot programs will be important both in themselves, and as models to be multiplied in later plans.

Program of Action

Land use

While a more intensive survey of the land now classified as wasteland may yield some addition to net area sown, it is broadly agreed that there is little scope for increasing the area under cultivation and the most hopeful way to increase production is to raise the per acre yield. If we take into account population increase, it will be seen that the net area sown per head, which was .81 acre in 1951, was reduced to .75 acre in 1960-61, and is expected to be reduced further to .68 acre in 1965-66. The present methods of cultivation are so primitive in most cases that considerable scope exists for improvement in patterns and practices. The fact that only 14 percent of the land under cultivation is cropped twice a year indicates the way to making agriculture more of a full-time and a productive job than it is at present. For all aspects of improvement in farm patterns and agricultural practices each village and each individual has to be encouraged to have a plan for the use of land which conforms most satisfactorily to its physical potentialities and to the scheme of investments included in the National Plan.

Irrigation

The key to agricultural progress in India is irrigation, as under natural conditions in most parts of the country cultivation of land tends to remain a single-crop, precarious occupation. The major irrigation works which were commenced during the First and the Second Five-Year Plan periods are either completed or in process of completion. Much remains to be done in regard to fuller utilization of resources thus made available. This aspect is already receiving attention and work on it will be intensified during the Third Plan period. Minor irrigation works, which cost less, can be completed earlier, and can utilize local resources to the full, are also being increasingly relied upon. Under the Third Five-Year Plan, about 13 million acres of additional land are to be irrigated by major and medium works, most of which are already under construction, and another 13 million acres are expected to be served by new minor works, including wells, tanks, and lift irrigation. An appropriate program of crop planning and watering practices is being worked out by detailed research and trial. Nearly 250 crores of rupees are proposed to be earmarked for minor works. These will be executed and maintained through local councils and cooperatives as far as possible. Progress in irrigation renders other aspects of reform more acceptable and fruitful.

Soil conservation

The main risk to non-irrigated land as a permanent asset arises out of its liability to erosion. Some major regional schemes of development, including control of streams, are needed to prevent such risks. But in most cases area, village, and field bunding and terracing operations are found to be advantageous. Some technical and professional assistance and some capital investment are needed for undertaking these works. The Third Plan has made full provision for these through cooperative and governmental sources. Efforts are made to mobilize local labor through community organizations. This will continue during the next five years. About 50 million acres of desert lands have problems of their own, as have the 12 million acres which are marshy. Large-scale schemes of conservation, reclamation, or resettlement often make programs of consolidation of holdings more feasible. Such programs are already in operation in many States and provisions for strengthening them have been made under the Third Five-Year Plan.

Fertilizers

As important as irrigation and improved seed, if not more so, are fertilizers, as even to maintain the current fertility of soils under cultivation,

785 million tons of bulky organic manures would be needed as against an estimated output of about 310 million tons by the end of the Third Plan. Organic manures and green manures from urban and rural sources are being increasingly tapped. There is an educative as well as an organizational problem involved in augmenting the conservation and use of these fertilizer resources. A program for doing the needful is included in the Third Plan, and there is reason to believe that with the awakened appreciation for use of local fertilizers among the progressive farmers this program will attract wider support.

A more specific field research in combination with all variable factors, and a program of training adequate extension personnel in the conservation and use of fertilizers are also urgent needs. Since 1951 consumption of nitrogenous fertilizers has increased from about 56,000 tons to 100,000 tons in 1955-56. By 1960-61, the demand rose to over 400,000 tons, but due to inadequacy of internal production and shortage of foreign exchange for imports, availability amounted to only 200,000 tons. It is planned that production of nitrogenous fertilizers will increase to 1 million tons by the end of the Third Plan, and along with about 400,000 tons of phosphates it will substantially meet the more obvious requirements of chemical fertilizers.

Implements

It used to be said that for the conditions in which Indian agriculture is carried on, the implements in use are economically the most suitable. This is no longer true. The prospects of intensive market cultivation hang on physical efficiency as well as economy of time and other resources. Animal power is found to be uneconomic and unsuitable for several operations. Improved devices for essential services such as ploughing, sowing, and harvesting are in increasing demand. Large-scale mechanization is not considered feasible under present conditions, but the role which selective mechanization can play is receiving attention. Where more than one commercial crop is grown in a year, and the size of the holding is an economical one—as in several parts of the Punjab—already the farmers are going in for light tractors. The practice of cooperative use of tractors and improved implements is not as widespread as may be expected, but the Third Five-Year Plan is, for the first time, bringing into prominence a program of modernization of implements. Electric motors and oil engines are spreading to the villages, and in both respects the Third Five-Year Plan has quite an impressive though by no means an ambitious program. Service stations and training of rural personnel in the use and maintenance of improved implements are also planned. Regional research-cum-training centers for bullock drawn implements are being set up.

Mixed farming

Along with cultivation of crops, which may be part of a pattern of rotation, farmers are being helped to add other lines to their business, e.g., horticulture, dairying, animal husbandry, and poultry. To make full use of agricultural resources and to add to the net productivity of agriculture all these outlets are being studied. The use of grazing for dairy cattle is coming to be more and more appreciated. Over the Third Five-Year Plan period all towns having a population of more than 100,000 are expected to be covered by organized dairy schemes which will utilize milk cooperatively supplied by farmers in surrounding villages. The pattern will spread in due course to smaller places as well. The supply of eggs and table poultry and of pigs will be substantially increased. These products of mixed farming are expected to improve the diet of the people and to reduce the dependence on cereals. It is expected that by the end of the Third Five-Year Plan the consumption of milk will increase from about 4.5 ounces to about 6 ounces per adult per day. In itself this appears to be a small aim, but spread over more than 200 million adults it would not be considered beneath notice.

Research and education

By 1963 it is expected that all villages in the country will be brought within the scope of national extension service. Farmers in all areas will thus be approached by active agents of a program of agricultural reformation. While the end of the extension process is the advice and service in the field of the farmer, its earlier stages of training village leaders, extension workers, specialists, and researchers have also to be attended to in good time and on the required scale. The Third Five-Year Plan provides for all these so that all the other physical and organizational aids created for the farmer may be appropriately used by him. Besides this regular system of research, training, and extension, for every new program intensive educational campaigns, supported by requisite guidance and supplies are undertaken. In areas selected for intensive agricultural development all these features are employed in full measure. While such areas will be confined for the present to a single district in each State, all districts have the benefit of the constantly improving general Extension Service. Subject to vagaries of the season, and to the overall paucity of resources, it can be confidently stated that the standards of cultivation and rates of productivity are steadily on the increase everywhere.

Marketing

The disadvantages of the traditional system of marketing agricultural produce through trader-financiers are well known. A determined attempt

is being made to replace this agency, as much as possible, through institutionalized processors and marketers. This means largely the regulation of market organization on the one hand, and the setting up of marketing cooperatives on the other. While regulation of markets is proceeding fairly rapidly, and the Third Plan provides for further development in the same direction, the setting up of marketing cooperatives is lagging behind. This is due partly to the small size of a rural cooperative and to the relative inexperience of the average cooperator. Largely, however, it is due to failure of cooperative credit agencies to meet all the needs of productive credit and to enforce the discipline of an integrated cooperative organization for credit, processing, and sale. In all these respects a more intensive program of development is planned for the next 5 years. At the base, it is proposed to attract about 75 percent of the total agricultural families, i.e., about 40 million—into the cooperative fold. To the extent to which all the production needs of this large membership are in fact met, both production and net income in agriculture will show an appreciable increase.

DISCUSSION: PLANS OF AGRICULTURAL DEVELOPMENT IN INDIA

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It gives me great pleasure and satisfaction to be sharing this program with so distinguished an Indian citizen as Professor Karve. I recall with gratitude the helpful advice and comments he so willingly gave me on my own work in India several years ago, and I feel a special pride in following him here today.

Professor Karve has given us a carefully prepared and well rounded view of the present problems and future hopes of Indian agriculture. He brings to his topic a lifelong concern for the welfare of his country's rural population, and it is right that he serve as a guide for this audience by giving to us a broad view of India's aspirations and the means by which she hopes to achieve them.

He is also right, I think, in confining today's remarks to the level of descriptive analysis. Among the few of us who are professionally interested in India there may be some pangs of disappointment for Professor Karve is well-known as a preceptive and extremely capable economic scholar, but it is characteristic of him to want to talk about the real problems with which India must grapple rather than presenting a display of erudition far removed from the true arena where the battle with poverty is being fought.

But I venture to guess that it is not just a wise understanding of the real issues that led him to discuss with us the plans for Indian agriculture. Knowing India's long history of seeking truth through discussion, it is highly likely that his major concern was to place before us for our comments the judgments of his nation on rural development.

It is in this light that I have approached my task of beginning what both he and I hope will be a broad general review of Indian development policy.

I confess I find myself somewhat mesmerized by Professor Karve's paper, and indeed by much of the developmental writings that are pouring out of India. Everything looks so good; nothing appears to be left out. The broad approach to land use, farm credit, marketing, Extension and research, etc., seems so right. Things should happen—and they have been, but not nearly to the extent desired. In fact India's food supply is increasing little more than her population, and after 10 years of development, planning, and investment one must, I think, frankly admit that self-generating rural development has not started, and that the hopes of the first two Plans have not been realized. It now looks as if the Third Plan intends to replicate, on a larger scale, the procedures of the previous two. This may be good or bad; the part I find distressing is that the replication is being done with little knowledge of what went wrong before and why it went wrong.

For example, Professor Karve points out that problems such as a shortage of chemical fertilizer and the slow progress of seed multiplication beset the Second Plan. But I would like to know why greater allocations were not made in the plans of 1955 to these critical factors of production. It is true that irrigation was and is important, but I rather suspect that the rate of return on a not insignificant part of the irrigation investment of the Second Plan could have been substantially increased had it been allocated to fertilizer manufacture. Where, in this planning process, were the economic studies which must be made to guide rational investment decisions? If they were not available for the Second Plan, are they available now? And if they were available for the Second Plan, are the mistakes which were obviously made being guarded against at this time? Professor Karve tells us little about these matters. I sincerely hope his assurance that experience is being a good teacher is correct.

I also hope he will excuse my pessimism when I look at the Third Plan targets for I find little ground in his paper, or elsewhere, for believing that within 5 years the rate of increase in agricultural output can be lifted from 3.1 percent per annum to 6.0 percent. After all the Second Plan succeeded in raising the rate by a mere three-tenths of 1 percent, and in 1955-56 its targets were almost as hopeful as those now proposed for the Third Plan.

Nor do I find any reason, at least in the present paper, for justifying the establishment of such targets. It is well to aim high, but surely it is also well to be realistic about how high we can expect our best efforts to carry us. If, as I suspect, the targets are set by asking questions like "How much do we need to be self-sufficient in food production?" then surely it is the task of the economist to realistically answer: "Do we want self-sufficiency as our goal, and if we do, at the present state, and with our best efforts, can we honestly hold hopes of reaching this goal?" Perhaps India's economists believe they can double the rate of increase of farm output. If so, we need more evidence to support the belief than is presented here.

I have not yet seen the Third Plan so I find myself unable to comment critically on much of the factual material which Professor Karve has given us. But his text does raise several questions, three of which I would like to briefly pursue before closing my remarks.

The first relates to the ominous cloud of population. Professor Karve gives us some data on this vital issue. He points out that net area sown per capita declined 8 percent between 1951 and 1961, and is expected to be down another 13 percent by the end of the Third Plan in 1966. These are highly significant data and I wonder if it is equally significant that Professor Karve makes no mention of any remedial action being included in the Third Plan. An allocation of investment funds to land reclamation and bunding is hardly an adequate answer to this most crucial problem.[1]

The second issue centers on the allocations which the Plan makes to the various items of expenditure on rural development. Two of these attract my attention.

The first is the allocation to research. No figures are given us; in fact, we have only the bland assurance the Plan provides that researchers will "also be attended to in good time and on the required scale." My question is obvious. It is the opinion of many that research is badly lagging in India, and until the Extension Service is given the "stuff" to extend, and the farmer provided with a bundle of complementary new practices, Indian agriculture will continue to rely on the primitive but proven methods of the past. I think there is strong evidence that research money has, in the past, had a high rate of return in Indian agriculture. I see no reason for believing the case is any different now, but I do know that research allocations were pitifully small in the First and Second Plans, and

[1] Subsequent to preparing these remarks I have learned that the Third Plan does allocate $105 million to population control programs. The effects of this allocation may be offset, however, by an allocation of $1,550 million to "general health improvement" which will probably result in a lowering of the death rate. *Time* (Canadian Edition), Aug. 18, 1961, p. 31.

I hope the same mistake will not inhibit the technical progress of agriculture under the Third Plan.

The second question on allocation priorities is the concern of the planners to re-structure the economic institutions of rural society. In his section on marketing, Professor Karve leads off with the sentence: "The disadvantages of the traditional system of marketing agricultural produce through trader-financiers are well-known." He goes on to indicate "A determined attempt is being made to replace this agency . . . [by] . . . the regulation of market organizations on the one hand, and the setting up of marketing co-operatives on the other." Frankly, I'm not too sure I know of the disadvantages of the traditional system of marketing, and from what I have seen of farmer co-operatives in India, I'm not too sure that "determined efforts" in other directions would not have a much higher payoff. From an economic and social point of view far too little is known of the relation of the middleman-financier to the matrix of rural life.[2] Until more is known about this institution (a research problem), and until one is sure there will be real gains in utility capturable by society when it is replaced, the expenditure of scarce resources to re-structure rural marketing cannot be justified on economic nor, I suggest, social grounds.

A third major issue raised in today's paper is one of fundamental economic importance. Professor Karve never once mentions a concern over the motivation of India's farmers. Throughout the entire paper the failures and successes, the frustrations and aspirations of rural development are subjects of government action. Marketing, milk production, land use, even the question of joining a co-operative is not seen from the standpoint of the rural cultivator.

Marketing co-operatives, we are told, are lagging, among other reasons, because of inexperience of the typical co-operator and because of a failure by the agencies to enforce discipline. Unless Indian farmers have changed in the last 6 years, I would suggest that the failure is simply because belonging to a co-operative in India most frequently carries little economic return.

The lack of an economic perspective in Indian planning is reflected in

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[2] In this connection I have recently received a fascinating paper on the economic and social role of the trader-financier in the rural life of Malaya. See Wharton, C. R., Jr., *Marketing, Merchandising, and Money-lending: A Note on Middleman Monopsony in Malaya*, Preliminary Draft, mimeographed, Council on Economic and Cultural Affairs, Inc., Univ. of Malaya in Kuala Lumpur. Wharton holds that there is a symbiotic relation between the small rubber producer and the middleman and while the conditions for monopsony gains are clearly present, there is still room to debate the extent of these gains. Indeed the small farmer frequently views his relation with the middleman as an advantageous one. A view which has important consequences for a policy which seeks to suppress or replace this long established institution.

a rather curious statement on agricultural production. I quote: "For all aspects of improvement in farm patterns and agricultural practices each village and each individual has to be encouraged to have a plan for the use of land, which conforms most satisfactorily to its physical potentialities, and to the scheme of investments included in the National Plan."

There is nothing here about why a farmer should plan for physical potentialities, no recognition that if farm improvement has not occurred it might be because it was just plainly unprofitable for the farmer to undertake the improvements, or, relative to risk, to adopt the new patterns and new practices. There is growing evidence that the Indian farmer is also a very capable economist, and unless the National planners break with the tradition of individual enterprise in agriculture, I think they will continue to find their best laid plans run afoul of the economic facts of farm operation, and the economic wisdom of the rural peasant.

Regardless of how much paper is consumed by plans, the Indian farmer still holds the crucial key to rural progress in the nation. And he will find and respond to those aspects of the new which will materially benefit him, and reject—in spite of physical potentialities—those items which are risky or which will result in low rates of return to his investment. Let India's planners recognize that despite legislative restrictions a farmer can still find a ready market for high interest mortgages and loans, and all additional alternatives for his scarce capital will be measured by their yield relative to this interest rate.

Let me close by adding that it is easy to be critical of what somebody else is doing. The key word here is "doing." Unlike many other countries, India is "doing"—and doing with a vitality and gusto that is immensely satisfying. In examining her methods and goals there is much about which honest men can differ, but the resolute action of the Indian people in their struggle to overcome poverty can evoke only unanimous praise.

THE DEVELOPMENT OF BRAZILIAN AGRICULTURE, 1945-1960

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GENERALLY speaking, the period 1945 to 1960 was a satisfactory one for the Brazilian economy. Between 1948 and 1959, years for which data are available, the gross internal product[1] grew at an annual rate of 5.8 percent. This permitted an annual growth of 3.3 percent per capita for the period. The value of the gross internal product for 1959 amounted to 1,837.4 billion cruzeiros, or 28,613 cruzeiros per capita.[2]

The Position of Agriculture

During this period, the growth rate in agriculture was not as great as that of industry. The Real Product, which measures the flow of physical production,[3] shows that for 1958–the last year for which data are available–agricultural production reached an index of 141.8 (1949 = 100) which is considerably below the 235.1 attained by industry and the average of 168.7 registered by the country's economic activities.

Nevertheless, this growth in the agricultural sector is quite satisfactory, when analyzed from an over-all viewpoint. By using another series of data put out by the Getúlio Vargas Foundation (table 1), index numbers establish that agricultural production expanded from 62.7 in 1945 (1958 = 100) to 139.1 in 1960.

By dividing the over-all output into its main sectors–products for domestic consumption and product for export–two facts of major significance come to light: (a) Production for domestic consumption, foodstuffs as well as raw materials for industry, is growing at a pronounced rate; and (b) among the export products, only the so-called traditional ones–coffee and cacao–show an increase, whereas the others have suffered a decrease in production. These facts deserve closer study.

Products for domestic consumption

Among domestic consumer products, foodstuffs record a very favorable and almost constant rate of growth, with the 1945 index of 58.4 reaching 113.4 in 1960. A similar picture of growth is that of raw materials

[1] Data in this paper which refer to Brazil's national account have been computed by the Getúlio Vargas Foundation and are published in the Revista Brasileira de Economia, March, 1960.

[2] Equal to US$183 per person, if the average exchange rate of Cr$156/US$1 is adopted. Due to the complex exchange system in Brazil, this conversion can scarcely be compared to other countries.

[3] In the Brazil's national accounts . . . "the index of Real Product only measures the physical development without considering the alterations in the buying power that are originated through foreign trade as a consequence of the changes in the import and export prices." Revista Brasileira de Economia, March 1959, p. 12.

TABLE 1. PRODUCTION AND REAL PRICES INDICIES OF AGRICULTURAL PRODUCTS, BASE YEAR 1958=100

Year	Domestic Consumer Products				Export Products				Total Products	
	Food[1]		Industrial Raw Material[2]		Traditional[3]		Others			
	Production	Price	Production	Price	Production	Price	Production	Price	Production	Price
1945	58.4	115.5	70.6	157.0	50.9	103.7	100.0	100.6	62.7	112.5
1946	67.3	106.9	75.5	139.6	55.5	118.7	99.8	132.9	68.8	114.7
1947	67.4	94.7	105.8	127.5	57.0	97.6	91.1	109.7	68.9	98.7
1948	71.4	102.7	67.6	124.5	60.9	97.1	87.8	117.4	70.3	103.8
1949	74.5	103.3	68.3	121.6	64.3	113.1	101.0	115.9	74.6	108.4
1950	78.9	96.9	66.0	117.7	65.3	197.8	100.9	137.6	77.2	131.0
1951	80.1	97.8	76.8	119.2	64.4	184.7	91.2	168.5	76.9	131.5
1952	77.6	107.7	73.2	112.4	66.5	169.7	118.2	120.5	79.2	126.8
1953	81.4	124.0	78.9	123.2	68.4	169.3	95.2	101.9	78.8	134.0
1954	87.5	114.6	84.4	122.2	63.8	212.2	100.4	102.3	82.3	140.8
1955	89.3	118.4	84.7	111.8	81.9	182.4	108.1	101.4	89.3	134.0
1956	91.3	115.2	107.4	116.6	60.6	146.5	105.2	95.7	85.1	121.7
1957	100.1	105.1	95.5	116.1	84.3	133.0	106.4	89.5	103.6	111.5
1958	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959	101.8	109.4	100.1	93.5	248.5	82.6	119.0	102.7	144.9	102.3
1960	113.4	108.7	109.1	89.9	200.3	110.4	126.0	100.8	139.1	107.6

SOURCE: Brazilian Institute of Economics, Getúlio Vargas Foundation, Rio de Janeiro.

[1] Corn, rice, beans, potatoes, onions, tomatoes, garlic, manioc, bananas, oranges, and beef.

[2] Peanuts, rubber, sunflower seed, jute, tung, and grapes.

[3] Coffee and cacao.

[4] Cotton, tobacco, sisal, babassu, carnauba, oiticica, castor oil, piacava fiber, and Brazil nuts.

TABLE 2. WHOLESALE PRICE INDICES OF AGRICULTURAL AND GENERAL PRODUCTS
Base Year 1948=100

Year	Agricultural Products			General Wholesale Price Index[3]
	Vegetable[1]		Animal[2]	
	Total	Without Coffee		
1945	61	61	63	75
1946	71	65	76	86
1947	84	82	83	91
1948	100	100	100	100
1949	114	103	105	109
1950	134	93	119	124
1951	149	99	159	148
1952	173	130	211	163
1953	195	166	235	188
1954	269	186	286	245
1955	289	223	364	277
1956	345	285	400	330
1957	373	320	449	371
1958	388	339	506	417
1959	528	516	636	574
1960	622	594	1,193	750

SOURCE: Brazilian Institute of Economics, Getúlio Vargas Foundation, Rio de Janeiro.
[1] Includes the 17 main commodities.
[2] Includes the 6 main products.
[3] Includes 90 products, covering all the foodstuffs, raw materials, and products of industry in general.

for industry, when, during the same period, output rose from 70.6 to 109.1. These, then, meet the demands of the growing population[4] which every year increases by 2.5 percent and whose consumption indices rise with an improved national income and with changes in social habits. Part of these changes are due to the country's heavy urbanization.

It is worthwhile noting that the growth in this area—domestic consumer products, that is—is in no way due to price increases. As will be seen from data given in column 2, table 1, real prices of the food products fluctuate around the base year figure, but show no sign of rising. Real prices of raw materials show a decidedly decreasing trend, from 157 in 1945 to 89.9 in 1960.

However, if we divide farming produce into commodities of vegetable and animal origin, we find that the above holds good only in the case of the vegetable sector, because prices for animal products rose considerably, from 63 in 1945 to 1193 in 1960. Vegetable products rose from 61 in 1945 to 594 in 1960, which is less, then, than the growth of the wholesale price index, which rose from 75 to 750 (table 2).

[4] The São Paulo and Rio populations jumped from 1.2 and 1.7 million inhabitants in 1940 to 2.3 and 2.4, respectively, in 1950, and it is reckoned that they will reach the 3.8 and 3.3 million mark in 1960. Five other cities—Recife, Salvador, Belo Horizonte, Porto Alegre, and Fortaleza—each have over 500,000 inhabitants.

The causes for the increase in prices of animal products must be found, in part, in the proportionately larger demand for these products by that part of the population which is urbanizing and changing their eating habits. It is also partly due to the fact that supply curves of the products tend to be inelastic. It is well known that the production of eggs, poultry, milk, and meat require techniques and natural resources not always available to the ordinary farmer. If price indices were available for vegetables and fruit, they would probably show similar results, for Brazilian farmers also have difficulties in adapting themselves to producing these commodities.

Export products

Insofar as export products are concerned, the situation is particularly serious. Brazil needs to import increasing amounts of fuels, machine tools, and raw materials in order to keep up its rate of economic growth. If exports are not enough to meet these requirements, serious difficulties arise in the balance of payments, with repercussions on the country's development.

Statistics show (table 1) that only the production of the so-called traditional commodities has increased, a rise which in some respects is truly impressive, because the 1945 index of 50.9 rose to 100 in 1958 and 248.5 in 1959, or almost a 1:5 increase in 15 years. This rise, however, is exclusively due to coffee, of which there is now a world glut, and the surplus production of which now has to be stockpiled within the country. These surpluses, of course, do not contribute towards increased exports. The remaining products, lumped together under the item "other products," show no increase in production.

As a result of this situation, the country's exports have not increased. The index (1948 = 100) rose from 84 in 1945 to 102 in 1946, falling off later, and showing no tendency to rise since. In 1960, the index was only 90.[5] And with this, the balance of payments during the period 1947-1960 showed a deficit in 10 different years, some of which were very high indeed,[6] and which had to be financed through various sources of foreign credit.

The fact that there was no increase in the production of export products (with the exception of coffee) as well as in the amount of exports, is due largely to the question of prices. The price rise which occurred dur-

[5] "Conjuntura Econômica," Vol. XV, No. 5, May 1961, p. 109. The volume exported in 1959 was 9.9 million tons and was 9.5 million for 1960 (11 months), producing US$1.3 and US$1.6 billion in foreign exchange, respectively.

[6] In the years 1951, 1952, 1954, and 1958, deficits were higher, reaching 291, 615, 203 and 253 million dollars, respectively. During the first 6 months of 1960, the deficit was already US$204 million. (*Boletim da Sumoc*, March 1961, p. 88.)

ing the first phase of this period, from 100.6 in 1945 to 168.5 in 1951, was not enough to stimulate production, and immediately following, prices fell to 101.9 in 1953 and remained around this level until 1960.

Exchange System Unfavorable to Agriculture

This price drop was due largely to the exchange policy of the Brazilian Government, which discriminated against export, and not so much due to an unfavorable situation in world markets. Beginning in 1947, to avoid larger disequilibrium in balance of payments Brazil adopted a series of exchange control measures without permitting corresponding modifications in the official exchange rates. Thus, the export sector was in an unfavorable position, for the cruzeiro quotations of its products did not follow the inflationary trend of prices in general.

A system of multiple exchange rates was adopted in 1953, with the claimed purpose of improving the export situation. However, no positive results came from this measure, and it was later referred to as the "exchange confiscation regulation" by disgruntled commodity producers. Import merchandise was divided into five groups, in accordance to their degree of importance. A system of auctioning was set up for each of these groups in which importers then bid for foreign exchange, paying levies ("agios") in addition to the official rates. At the same time, two classes were set up for exports whereby goods received premiuns of different values. These export premiums were stipulated by the Government, and were in addition to the official rate of exchange. Classification for these classes was made on a basis of the ability of certain products to stand the rates, or as a means to stimulating and promoting production of other products.

This system has undergone several changes regarding the number of groups and the values of the export premiums.[7] But the point worth stressing is that the amount of the premiums received for exported goods always remained considerably lower than that of the levies (agios) paid for imported goods. Hence, it may be assumed that exports always received lower prices than those they could have, had this system not been in force.

It is admitted that this system was initially advantageous to the economy of the country. Among other advantage, it allowed the Government to promote the establishment of industries regarded as being basic for the country's development, by setting favorable exchange rates for the importation of necessary machinery and raw materials. Moreover, through high exchange rates, the country's emerging industry was protected, and

[7] Current trends are towards the return of a single exchange rate, and Sumoc Instruction 204 and 208 has already set up measures in this direction.

imported competitive articles were handicapped. And with the cruzeiro balances resulting from this system,[8] the government was able to extend agricultural credit, pave highways, cover part of its budget deficits and, lastly, acquire coffee surpluses.

This confiscation which was imposed upon agricultural export products might then be considered beneficial to the country's economy as it had fostered quicker industrialization. However, as there was no encouragement given to increased production of export commodities, it finally became harmful to the general economy, for it imposed a limit on the capacity to import and, consequently, a limit on the rate of development.

Characteristics of Agricultural Production

An historic Brazilian agricultural characteristic is the tendency of farmers to abandon the old crop areas and move toward the interior in search of fertile, virgin land, which produces high yields without the use of fertilizers, machinery, and soil conservation methods.[9] Only in more recent periods, as these new areas have become scarcer and more distant from consumer centers and ports, the incentive has increased for farmers to remain in the already occupied areas and to strive to better their agricultural technique to increase productivity. Over the past years, a noticeable increase in the consumption of fertilizers has been recorded. The basic elements of nitrogen, phosphorous, and potassium increased from a total of 74,300 tons in 1950 to 235,000 tons in 1960. The same was true of tractors, their number rising from 8,372 in 1950 to nearly 70,000 in 1960; and of insecticides—another indication of the development of agricultural technique. However, these increases are not yet sufficient to raise the agriculture productivity to such levels as could be favorably compared with those reached by developed countries.

No satisfactory statistical figures are available regarding the evolution of agricultural productivity during the period under review.[10] Cer-

[8] In the years 1959 to 1960, the "agio" balances reached 70.2 and 125.4 billion cruzeiros, respectively. *Sumoc Bulletin*, March, 1961, p. 32. It is worth noting that the Union budget revenue was 157.8 billion cruzeiros in 1959, and 219.8 billion in 1960.

[9] Bringing about what Preston James termed a "hollow frontier." *Latin America*, Lothrop, Lee and Shepard Co., New York.

[10] The official statistical series concerning the average production per hectare are not considered reliable. Yet, indices of output-input ratios for the purpose of measuring the evolution of the efficiency of agricultural production or technological progress have been built by Wharton, Clifton R., Jr., "Recent Trends of Output and Efficiency in the Agricultural Production of Brazil, Minas Gerais, and São Paulo," *Inter-American Economic Affairs*, Vol. 13, No. 13, pp. 60-80; and by Moore, Clarence A., "Recent Development in Brazilian Agriculture," *J. Political Economy*, Vol. LXIV, August 1956, pp. 341-46. The Wharton calculations show that the evolution of efficiency in Brazilian agriculture reached a growth rate of 1.3 percent per year during the period 1940-55. Part of this growth is certainly due to the increase of the rate of occupation of virgin highly fertile lands during this same period.

tain facts, however, attest to a favorable evolution, as for instance, the previous belief established among the farmers and unchallenged by agricultural experimentation that new plantations of coffee could not be set up on old land.[11] And, indeed, they were not to be found on old land. Contrary to this belief, there are today, thanks to improvements in techniques, more plantations reactivated on old land. Recent studies made in the State of São Paulo show that 441.2 million coffee trees (nearly 1.3 million acres) were planted during the period 1949 to 1958, and of these, nearly a third were in typically old areas which no longer had so-called new land at their command.[12]

During the period under review, 1945-1960, chance improvements occurring in working conditions and land ownership were quite irrelevant. The country continues to be characterized by an ineffective pattern of land ownership, with a great number of large and medium-sized estates covering extensive areas, in which the owner performs only the function of manager. Wage levels and working conditions leave a lot to be desired. Internal migration of workers is continuous, mainly from the Northeast, which region is subject to catastrophic droughts, to the richer States of São Paulo and Paraná, in search of better wages and working conditions. Little has been done by the Government in the way of offering better chances to nonland owing farmers. Effective credit measures have not yet been taken for the acquisition of land, nor have more reasonable working contracts and land tenancy documents been drafted so as to take care of both the interests of tenants and of society as a whole.

Similarly, improvements in the marketing procedure of agricultural products have been few and far between. For such classical export commodities as coffee and cotton, private enterprises are adequately prepared with warehouses, processing machinery, and with such ancillary organizations as exchanges, insurance, and credit. The same holds good for meat packing plants for cattle slaughter, which have increased in number and improved in quality.

For other products such as rice, beans, manioc, and maize, there are still no reasonable facilities available to facilitate the marketing process, such as standardization of products, transportation in bulk, price information, and product movement services. Nor is there a commodity exchange to enable futures contracts to be transacted. The same is the case for perishable goods which suffer from a lack of better marketing conditions, particularly cold storage plants. The Government has tried to

[11] "But more important is the belief (or fact) that coffee cannot be grown a second time on the same soil and be profitable." Witt, Laurence W., "Changes in the Agriculture of South Central Brazil," *J. Farm Econ.*, Vol. XXV, No. 3, Aug. 1943.

[12] *The Coffee Industry in São Paulo,* Joint Studies of the FAO-CEPAL, IBC-SA. Also, *Agricultura in São Paulo,* Vol. VIII, No. 3, March 1961.

get around some of these difficulties by erecting warehouses and silos in various parts of the country.[13] And an attempt was made to establish by law a system of minimum price guarantees for cereals and other non-perishable products. So far this does not seem to be effective.

Future Prospects

Based on recent agricultural development and the fundamental characteristics of the Brazilian economy, the following general objectives can be established for agricultural development during the next 10 years: (a) A general increase of production so as to be able to expand the export market and to better attend to domestic market requirements; (b) an improved level of agricultural technique, thereby raising productivity; and (c) better leasing arrangements and rental contracts which will enable a fairer income distribution among those taking part in production.

It would be appropriate to investigate the likelihood of these objectives being reached by taking into account the country's existing natural resources and the availability of material resources, and in light of measures which might be taken by the Government which would favor or hamper the accomplishment of the objectives.[14]

With regard to the first objective—that of increased production—it can be stated that there is a chance of this being reached in the near future. Brazil has plenty of land for such a purpose as well as a large growing rural population, despite the current exodus of farmers to cities in search of better wages. Prospects for better prices for agricultural products are favorable. The country's ruling classes are aware of the necessity to back the agricultural sector and not to burden it with price regulations and unfavorable rates of exchange, as was their practice in the last few years with the exchange confiscation.

The recently-built highways joining the new capital of Brasilia to such outlying regions as Belém and the Territory of Acre will help in this respect, for, despite distances, it will encourage occupation of new areas. But the most important production increase must come from increased productivity of the old agricultural areas. It is felt that the national and State governments are particularly concerned with the need to foster this change. An example of this is the backing given to the establishment of new agricultural extension units, along the lines drawn up chiefly in the

[13] The goal for the Five-Year Plan (1955-1960) was to build warehouses and silos with 800,000 tons of storage capacity. By 1959, nearly 500,000 tons had already been built and numerous works were already in their final stage.

[14] The agricultural policy has not been a positive factor in the agricultural development. As J. S. Hillman has pointed out "in fact, one might even question the usage of the term 'Brazilian Agricultural Policy' because what exists in reality is a series of acts which lacks a common objective." Hillman, Jimmye S., "Some Aspects of Brazilian Agricultural Policy," *Inter-American Econ. Affairs*, Vol. XII, No. 1, p. 6.

organization formed in 1948 by the Rockfeller Organization and the State of Minas Gerais.[15] With the setting up of tractor manufacturing plants in the country,[16] plus the enlargement of the fertilizer, insecticide, and agricultural machinery industries, agriculture will be better supplied with the necessary technical resources. It is to be hoped, therefore, that the agricultural technical improvement being felt over the past few years will go forward at an even faster rate of progress during the next 10 years. But as technical backwardness of the country is still everywhere in evidence, one cannot expect its improvement to reach a rate sufficient to offset the backwardness, and to place agriculture on a level of productivity considered to be satifactory.

There is also concern regarding the improvement of city markets so as to make them more efficient with less chances of price speculations. Projects along these lines are being built in São Paulo and Rio.

Lastly, with respect to income distribution, the chances are small, indeed, of bringing about ample change within the near future. It is by no means an easy task to alter the situation of low rural wages and high land prices, which is characteristic of the Brazilian economy and which prevents wage earners from buying a piece of land out of their own savings. Low wages are partly due to the presence of a fairly high percentage of the population in areas unsuited to agriculture, such as the Northeast; wage earners in there areas emigrate to more suitable regions where wage levels and possibilities for employment are encouraging. Moreover, land prices are extremely high, mainly due to the inflation and to the limitation of capital markets, as a result of which it is reasoned land is still a safe capital investment.

These problems are not easily solved. But it is noticeable that the population is becoming aware of the problems concerning the agrarian reform, enabling us to believe that political conditions will in a short time be ripe for the government to adopt more effective measures. The Government of the state of São Paulo, for example, has already taken some steps by approving a special law which will allow the state to carry out immediate and positive action in this sense.

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[15] At the moment, 12 States have similar organizations, with a total of 215 operating offices taking care of 275 counties. "Abcar:—Five-Year Director Plan (1961-1965)," Rio de Janeiro.

[16] Production was begun in Dec., 1960. Plants are being set up and the overall schedule for June 1962, is 31,000 tractors.

DISCUSSION: THE DEVELOPMENT OF BRAZILIAN AGRICULTURE, 1945-1960

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Senor Paiva has done an excellent job in apprising us of the outstanding milestones and millstones in postwar Brazilian agriculture. To one who knows the overall Brazilian situation, there is nothing of major importance in this paper with which to quibble. But there are a few questions and points which should be raised, the consideration of which might improve and substantiate Paiva's statement.

As a takeoff point, I call attention to Paiva's implication that it is solely *because of* the surplus and stockpiling of coffee that Brazil has not been able to increase the value of her total exports. This is correct, but it fails to tell the whole truth. There could have been other reasons, not the least of which might be found on the demand side. Demand has not kept abreast of the coffee glut. The technical significance of this fact is to be found, of course, in the inelasticity of demand. But to blame the lack of increased foreign exchange earnings for the country's agriculture as a whole on the surplus and an inelastic supply factor in the coffee sector alone is stretching it a bit too far.

Another implication of this sort is to be found in the total blame that is assigned the price factor in the failure of other-than-traditional export crops to rise in production. This is too much of a one-way track of causal explanation. It ignores what might have occurred on the cost side. If costs had been sufficiently low—e.g., if they had decreased relatively per unit of output—production for export in sectors other than coffee might have increased despite decreasing prices. This is what happened to certain crops in the United States in the post-Korean War period. Furthermore, it appears that Paiva has overstated his case somewhat by saying there ". . . was no increase in the production of export products (with the exception of coffee) . . .," for as I read table 1 there has been, on the average, about a 2-1/2 percent increase in output per annum since 1950.

The exchange problem as it has affected Brazilian agriculture has been accurately treated. The penalizing facts about any multiple exchange rate system are those which relate to the "efficiency" of the system with respect to some allocative role, and the arbitrariness with which the system is administered. The coffee grower perhaps had a right to be disgrunted when he was paying for such costly mistakes as were being made in the wheat sector. In passing, one should say that wheat could have been given some specific mention in this treatment.

As I have not been in Brazil since 1957, except for a short period in

1960, I cannot verify the optimism which Paiva expressed regarding increased agricultural production and higher prices. On the basis of past performance in the domestic consumer products sector, however, and in addition, the perennial problem of Northeast Brazil, over optimism may prove dangerous. I certainly hope that he is right about the willingness of the ruling classes to support agriculture in its effort to increase productivity and to improve the lot of the rural people of that great country. If this be true, it will be a progressive alteration in awareness and attitude toward a basic problem in Brazil's development.

With respect to development, I have a personal suggestion on which these comments might be brought to an argumentative and controversial termination. The ubiquitous short course on economic growth and development—of this, Brazil has seen its share—has not helped to emphasize the particular needs of agriculture. Prebish's argument, reinforced by Singer's thesis, penetrated too far and has pervailed too long in the minds of many Brazilians and other Latin Americans. A secular deterioration in the terms of trade of these countries has been made the all-in-all perennial scapegoat for the economic ills of every country in Latin America, whether its economy be dominated by petroleum, coffee, copper, or bananas. Industrialization is offered as the cure-all, and, in the rush to industrialize, agriculture has suffered. Agriculture will continue to suffer if the right people cannot be convinced that it is to the land and its effective utilization that they must look for the basic source of food, fiber, and other resources to feed and provide for exploding populations.

SIGNIFICANT CHANGES IN JAPANESE AGRICULTURE SINCE 1945

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THE small size farm system of the Asian type and its place in an economy of rapid industralization of the modern type—these two features of Japanese agriculture make problems of "balanced growth" particularly important. Among many relevant factors, the following are among the most influential in determining possibilities of "balanced growth:" Factor proportions (in particular, the man-land ratio); institutional framework (in particular, land tenure system); human elements (the mentality of farmers), the possibilities of technical progress, and the functions of the rest of the economy, including role of the government.

Balanced growth between agriculture and the rest of the economy can be treated simply in terms of two aspects: the balance of supply of and demand for agricultural output; and that of per-head real income between farmers and working population in the nonagricultural sector.

Viewed from the standpoint of balanced growth thus defined, the history of Japanese agriculture marked two distinct periods before World War II. The first, a period of balanced growth, continued from the initial stage of modernization in 1868 until the years just before World War I. The second, a period of unbalanced growth both in terms of output and of income, covered for the most part, the interwar period of Japan's overseas expansion. During, and immediately after, World War II, there was a transition period in agriculture with abnormalities caused by the war, during which time the relative income position of farmers had been much improved under conditions of a food supply deficit. After normal conditions came again, around 1950-53, the third period began, and problems of balanced growth again arose. I would like to set the problem before me in this long-term perspective, with particular reference to the several factors mentioned above.

Land Reform and Changes in Human Factor

Through the first and second periods, a long-inherited landlordism constituted the basic institutional framework of agriculture. Tenanted land was almost half of the total arable acreage. High rent, paid mostly in kind, reached almost half of the yield. During the first period, landowners played a leading role in raising agricultural output and productivity, as they were rural "enterprisers," but toward the start of the second period they turned out to be merely interested in their absentee owner-

ship. Thus the land system before World War II survived as an important factor limiting the improvement of agriculture.

Immediately after World War II, the government, in cooperation with Occupation Authorities, carried out a drastic land reform program, transferring most of the tenanted lands to the tenants. Less than 10 percent remained as tenanted land. Absentee ownership was completely abolished, the upper limit of ownership being set at less than one hectare for noncultivators. Rent in kind was replaced by a controlled low cash payment. The compensation fee fixed at a more or less reasonable amount turned out to be an extremely low rate as a result of the galloping inflation that followed the land reform. Thus postwar agriculture started from a completely new owner-cultivator system without any burden of compensation debts.

A great change in the human factor was created by the land reform, associated with a fresh atmosphere of the democratization of political, social and economic life in postwar Japan. Farmers' ability and initiative were emancipated, their desire for expansion and progress was awakened, and their response to incentives was strengthened. Thus a fresh enterprising mentality has newly infused work in improving agriculture.

Worsened Man-Land Ratio

The working population in agriculture immediately after World War II increased to 16.6 million from the 13.9 million in 1940, and until 1953 it did not decrease materially. The number of farm households also increased to 6 million from the prewar level of 5.5 million. This increase was caused by the repatriated people from overseas and by retardation in the absorptive power of the labor force in urban industries.

Throughout our first and second periods the number of working population and that of farm households had been almost unchanged, so that the net increase of labor force in agriculture had been almost completely absorbed by the nonagricultural sectors. Viewed historically, therefore, the increased postwar population pressure in agriculture deserves particular attention. The average size of farms nationally dropped to 0.86 hectare in 1955 from the 1940 level of 1.12 hectares.

The program of land consolidation was not successfully carried out by land reform scheme, so that the long-inherited tiny portions of land remained scattered here and there. In addition, the scheme legally limited farm size, 3 hectare (12 hectare in Hokkaido) being set as the upper limit, and land transfer was put under strict control, so that the possibility of enlarging farm size was placed in an unfavourable situation. In comparing all farms in 1955 with those in 1940, farms less than one hectare increased from 66 to 71 percent, while those of one to two hectares decreased from 25 to 23 percent and those of more than two hectares de-

creased from 9 to 6 percent. This aggravation of the farms of tiny size is now a serious limiting factor in improving agriculture, particularly since the human element has been much improved.

Technical Progress and Mechanization

In spite of the worsened man-land ratio, postwar agriculture has made remarkable progress both in biological technology and in mechanization. One type of technical progress concerns the greater use of fertilizers, chemicals for insecticides, and disease control, associated with the introduction of improved seeds, and with increased possibilities of moving planting seasons. This type of progress was pushed mainly in conventional cereal cultivation, especially in the case of rice. Another type of technical progress concerns diversification. The best example is a surprisingly rapid progress in dairy farming. The population of milk cows jumped to 750,000 in 1960 from the prewar level of less than 100,000. Farmers became much more aware of livestock farming and the introduction of fodder cultivation into their traditional simple systems of crop rotation.

Mechanization of the Japanese type started before World War II, when fewer than 100,000 electric motors were used on farms and combustion engines numbered only 200,000. Now the former have increased to more than a million and the latter to 1.5 million. The agricultural censuses reveal that farm households which used electric motors or combustion engines increased from 57.7 percent in 1950 to 88.4 percent in 1960, that the tractors numbered 517,000 in 1960, an increase of eight times from 1950, and that motor sprayers numbered 400,000 in 1960, an increase of six times from 1950. These increases may be enough to show the extremely rapid tempo of mechanization of agriculture in the postwar period. Of course the smallness of farm-size is a great limitation to mechanization both technically and economically. Even machines of small size are too costly for most Japanese farms. Farms that used a motor cultivator or a tractor constituted 35 percent of the total in 1960, but only 30 percent used their own machines, most of the remaining hiring machines from other persons.

Rapid Increases in Output and Productivity

The agricultural production index showed an increase of output from 45.4 in 1945 to an average of 79.1 in 1951-53, taking 1955 as a base. This implies an abnormal tempo, caused by postwar rehabilitation, but even after normalization the average annual rate of increase in agricultural production was 3.9 percent for the years 1951-60. The real national income produced in agriculture also increased rapidly, though at a slower rate than that of the production index, as meanwhile the ratio of cost (expenditures for intermediate goods and services and depreciation) to gross

output increased. The cost ratio rose from 26.2 percent in 1951 to 35.7 percent in 1958. For 1946-52 the annual average rate of increase in agricultural income was 4.2 percent and for 1952-59, 2.7 percent. The rate of increase in income per head in agriculture was 5.3 percent for the former period, 3.2 percent for the latter. The comparison of these figures after normalization with those of prewar periods suggests that postwar agriculture made a second spurt in accelerating its rate of growth. During the first period, before World War I, Japanese agriculture made its first spurt, with a growth rate of net income producing around 2-3 percent. During the second period, however, it decelerated to an average of 1-2 percent. The postwar spurt therefore deserves particular attention from the long-term perspective.

What factors or what combination of factors were responsible for the second spurt? It is difficult to answer this question quantitatively. It can be said with confidence, however, that land reform and the renewed human factor did contribute to it basically. More directly, the technical progress backed up by the increase in both working capital and equipment investment was certainly responsible for increases in output and productivity in agriculture. Several analyses revealed that the technical progress of biological nature directly effected output increases, but that the mechanization had rather indirect effects, in saving the labor input which in turn was transferred to intensifying the cultivation of other crops.

The Government played a great role in implementing big scale projects of reclamation, irrigation, drainage, etc., either directly or through public cooperation. Conventional measures of supporting prices, giving various subsidies, enlarging extension services, and the like also must be counted among the factors accelerating output increases.

Lastly, the favourable terms of trade to agriculture, which were basically caused by the postwar over-demand situation in the food economy, was a good incentive for farmers. After normalization, rapid progress in diversifying food demand, mainly due to the rapid increase in real income per head, was an additional incentive. In this respect, the rapid rate of growth of the nonagricultural sector contributed much in making better conditions for improving agriculture.

Unbalanced Place of Agriculture

With these improvements, farmers enjoyed a better income position than they had in prewar days, and this favoured their increasing both consumption and investment. As the process of normalization was completed, however, problems of unbalanced income of farmers again gradually came into issue, because the rate of increase in income per head

in the nonagricultural sector continued to be larger than that of agriculture. The income per head of farm-households (non-farm income included) in 1951 was 94 percent of that of the urban worker's household; it decreased to 70 percent in 1958.

The relative position of agriculture in the national economy changed greatly in the postwar period. Immediately after the war, the agricultural income in the domestic net national product at factor cost rose to 31 percent, which was as high as that of the 1920's. Since then it has decreased sharply year by year to the present level of 13 percent. On the other hand, the working population in agriculture decreased from 49.9 percent in 1947 to 37.7 percent in 1955, though it was still very large. Hence relative income per capita of working population in agriculture decreased rapidly to the recent level of 34 percent from 58 percent in 1947, taking the nationwide averages as base. During the same period farm-households which have off-farm jobs increased also rapidly. It rose from 44.6 percent in 1947 to 65.8 percent in 1960. The proportion of non-farm income to the total of farm household income increased from 28.9 percent in 1950 to 44.5 percent in 1959. This shows a significant increase in the relative position of nonagricultural income in the farm economy, though some allowance should be made for an upward bias due to the revision of survey methods. Thus problems of the "unbalanced growth" of agriculture, which existed in the second period, again became an issue in the process of rapid growth of the Japanese economy. This is the core of the agricultural problem in the *third* period.

Outlook for the Coming Decade

Two factors are prominently influential in forecasting the future trend of Japanese agriculture: (1) A change in the composition of demand for food, and (2) a decrease in the working population in agriculture. Both factors have recently shown noticeable effects on the economy and are expected to continue to do so for the decade to come, as the growth rate of the Japanese economy can be expected to continue to be rapid. The former relates to balanced growth in the supply of and demand for agricultural output, the latter concerns the balanced growth of farmers' income.

The Government has inaugurated a "Doubling Income Plan" (1961-1970), and the maintenance of balanced growth of agriculture is one of its major targets. The annual growth rate of agricultural output is projected to be 2.9 percent, implying changes in output composition as follows—the output proportion of livestock farming will rise from the present 14 percent to 30 percent, while that of the conventional farming will decrease from the present 86 percent to 70 percent in the target year. The working

population in agriculture is expected to diminish by an annual rate of 2.9 percent, so that the rate of increase in income per head produced in agriculture is projected to be about 5.8 percent, a rate almost equal to that of the nonagricultural sector.

Whether these targets can be fulfilled will depend basically upon the capability of overcoming the "diseconomy of small scale" which has widely prevailed in the Japanese farming up to the present time. Cereal production now tends to be in over supply, but the desirable diversification needs both investments and cost-reducing innovations. A rapid income rise also requires productivity increases dependent upon enlarging farm size. Analytical reasoning which follows is based on the retabulated data of the Farm Economy Survey. A basic relationship that labor productivity (net output per unit of labor input) tends to increase as the land intensity (land area per unit of labor input) and the capital intensity increases is discernible in Japanese farming, but it is particularly to be noted that there is a *turning point* in this relationship. From the middle income class, whose size of land holding is 1.2 to 1.5 hectares, to the upper income classes, the above relationship is strongly positive and the elasticity seems to be greater than unity, but towards the lower income classes there is no positive (in the case of land) and even a negative (in the case of capital) relationship. As will be expected, the capital-output-ratio tends to decrease sharply from the small size to the middle size, and still decreases moderately towards larger sized farm. This suggests a basic fact that diseconomies of small scale definitely exist and that in particular a diseconomy in the employment of capital is significant.

If the overemployment of labor is lessened by the expected decrease of the labor force in agriculture, and if the program of consolidation toward a larger size farm than the size of the middle class farm mentioned above is effectively encouraged by various measures on the part of the government, then we can possibly expect a balanced growth in the coming decade.

DISCUSSION: SIGNIFICANT CHANGES IN JAPANESE AGRICULTURE SINCE 1945

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This brief paper will be of great interest to scholars abroad who have awaited an analysis of the striking changes that have been taking place in Japanese agriculture since the end of World War II. In a few pages, Professor Ohkawa succeeded in describing the remarkable expansion of

output that has taken place and has identified the principal factors responsible for this rapid increase in output and productivity.

Those responsible for assessing Japan's economic prospects during the early postwar period were convinced that rising food import requirements would aggravate the serious difficulties Japan would encounter in reestablishing a viable economy capable of earning sufficient foreign exchange to finance needed imports of food and of industrial raw materials. I do not believe that anyone concerned would have been so rash as to predict that the increase in Japan's agricultural output between 1945 and 1951-53 would approach 75 percent. (The 75 percent increase shown by the official production index overstates the actual increase to some extent because of underestimation of production in the immediate postwar period.) Moreover, rapid expansion of agricultural production has continued, the rate of increase averaging almost 4 percent through the decade 1951-60.

In spite of the increase in the country's population from 69 million in 1935 to the current level of 94 million, Japan's food imports have increased scarcely at all since the 1930's. Wheat imports have been large as compared to prewar, but rice imports fell below 200,000 tons in 1960 compared to a level of about 2 million tons in the mid-1930's. The composition of Japan's agricultural output has for the first time begun to show a marked shift away from overwhelming dependence on starchy staple foods in the direction of increasing reliance on livestock products and other more expensive sources of food calories. The 36 percent increase in population, together with the rise in per capita food expenditures associated with the decline in the "starchy staple ratio," have accounted for a large increase in demand for agricultural products which has provided scope for the rapid expansion of agricultural output.

It is, of course, because of the impressive increases in agricultural productivity that this enlarged demand for agricultural products has been satisfied almost entirely by increased domestic production. If farm output had not increased at a rapid rate, the large expansion of demand would have had one of two effects. It either would have provoked an inflationary rise in food prices—which, in fact, occurred only during the immediate postwar period, when imports were drastically curtailed—or it would have led to greatly enlarged food imports.

The increase in agricultural income during the past decade has been somewhat less than the 3.9 percent rise in the agricultural production index owing to the considerable increase in expenditures for agricultural inputs. The ratio of the cost of inputs to the gross value of output had increased slowly since the late 19th century; but we see in the data that Professor Ohkawa presented that this cost ratio rose sharply from 26.2 percent in 1951 to 35.7 percent in 1958.

The rate of increase has not only been more rapid than in earlier periods but the factors underlying the increase in agricultural productivity and output have been more complex. Professor Ohkawa singles out the following as factors worthy of mention because of their probable contribution to the increase of farm productivity since 1945:

1. An increase in the initiative, incentive, and capacity—psychological as well as financial—of Japanese farmers to introduce improved farming methods as a result of the postwar land reform and the concurrent democratization and social emancipation of village life.
2. Technical progress along the familiar lines of greater use of fertilizers and seed improvement, a great increase in the use of chemicals for insect and disease control, and other improvements in farm practices.
3. Changes in the combination of enterprises, notably in the rapid increase of dairy cattle and other livestock enterprises.
4. Further mechanizations of auxiliary operations and, for the first time, a significant degree of mechanization of field operations, 35 percent of all farmers using their own or a hired motor cultivator or tractor during 1960.
5. Government programs to support land reclamation, irrigation, and drainage.
6. A government price support program.
7. Creation of an enlarged and more effective agricultural extension organization.

Professor Ohkawa did not attempt to evaluate the contribution of these various factors, a task which would have been impossible within the compass of a brief paper. Owing to the complementarity that characterizes various measures to raise farm productivity and the problems that arise in quantifying returns from expenditures for "nonconventional inputs" to increase agricultural output, it would be extremely difficult to assess the relative significance of the factors responsible for the increase in farm productivity. But in view of the importance of determining the most effective means of developing agriculture in low-income countries, it is to be hoped that Professor Ohkawa will pursue his analysis of recent changes in Japanese agriculture in that direction.

The rapid expansion of non-farm incomes of agricultural households during the 1950's is another noteworthy development that calls for fuller analysis. It is also to be hoped that additional details will soon be forthcoming concerning the agricultural aspects of Japan's "Doubling Income Plan" which envisages further rapid increase of farm output and reduction of the agricultural labor force at the phenomenal rate of 2.9 percent per year. Professor Ohkawa's brief reference to economies of scale that arise when capital equipment is used in conjunction with larger land

units calls attention to a difficult problem that is likely to become critical during the next decade. Can pressure on the land resulting from Japan's dense rural population be eased sufficiently by rapid transfer of population out of agriculture to make it desirable to enlarge the existing ceiling on farm holdings and thus make it possible to establish larger farm units for more economical utilization of farm machinery? In fact, as Professor Ohkawa points out, the common fragmentation of holdings means that most fields are considerably smaller than the average farm holding (.86 hectares in 1955) and much smaller than the 3 hectare ceiling fixed by the land reform legislation. A striking feature of the postwar agricultural development in Japan is the way in which small cultivators and tractors have been designed and arrangements worked out for hire or joint ownership to permit mechanization to proceed at a rapid pace despite the exceedingly small size of the farm holdings and plots.

EMERGING PROBLEMS IN WATER ECONOMICS

CHAIRMAN: HARRY STEELE, ECONOMIC RESEARCH SERVICE, USDA

THE STOCK RESOURCE VALUE OF WATER

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THE agricultural fundamentalists are fond of extolling the virtues of agriculture as a way of life, as the well-spring of the homely virtues in a materialistic-urban society. Not the least among its many values, it is popular to presume, is its "permanence," its "stability" as a source of "new wealth" in contrast to such other primary resource based industries as mining and the harvest of virgin forests.

This presumed "stability" virtue of agriculture is derived from its usual dependence upon a flow resource. Inexhaustible under reasonably prudent systems of management, this flow resource may become exhaustible through error in management or because temporary economic forces cause exploitation in management. But in many emerging situations, especially in arid areas, largely due to technological developments related to extraction of water from the ground, agriculture has become dissociated from its flow resource underpinning and has become an industry based on a stock resource. As with extraction of oil, minerals, or the harvesting of virgin forests, any industry built on the exploitation of a stock resource—in this case, agriculture sustained by a stock of water—must ultimately decline and cease. The rate and timing of the decline and its terminus is a function of the technology of exploitation, economic relationships, and the institutional matrix.

Stock and Flow Resources

Following Ciriacy-Wantrup, stock and flow resources as the terms are used herein are defined as follows: *Stock resources* are those resources whose "total physical quantity does not increase significantly with time . . . each rate of use diminishes some future rate."

Flow resources are those resources whereof "different units become available for use in different intervals. . . . The present flow does not diminish future flow, and it is possible to maintain use indefinitely provided the flow continues."

Whether or not an industry rests on what is deemed to be a stock or a flow resource stamps its related institutions with distinguishable characteristics. If, as is customary vis-à-vis agriculture, the industry's substructure is thought to be a flow resource, natural resource values, debts, and investments (both public and private), and the property, financial,

and social institutions environing that industry will be formed "as if" the stream of net income and the society generated therefrom will be perpetual. The future is discounted only for time preference and dynamic risks. On the other hand, when the industry's substructure is thought to be a stock resource, natural resource values, debts and investments (both public and private), and the property, financial, and social institutions environing that industry will be formed with due regard to the limited life span of its resource foundation. An effort will be made to maximize returns over its limited life span.

Any industry, including agriculture, will exhibit certain peculiar characteristics when realization, that its resource foundation is a stock rather than a flow, permeates the awareness of its human agents. Asset values that contain speculative elements because of the appreciable "unearned increment" that accompanies development and exploitation of a new resource increasingly will contain "unearned decrements" for similar but opposite reasons. Because of the deep rooted belief that agriculture's resource base is permanent, the tendency will persist to capitalize current and prospective earnings into values in perpetuity. The same psychology will "over build" or "over commit" for public as well as for private facilities. The growing realization that the industry, economy, and society erected on the exhaustible resource is not permanent can be a traumatic experience. Search begins—sometimes frantic, sometimes deliberate—for flow resources to replace the disappearing stock, for "new industries" dependent upon other community resources than the one that is disappearing; for public or private (usually public) financial assistance from within the community or from outside (outside assistance usually meaning Federal aid). Property institutions, especially those relating to water, come in for extensive examination and likely over-hauling to ease the problem of depletion and change.

In this paper I wish briefly to examine the economic analysis pertinent to establishing the economic basis for appropriate action in such cases and the institutional modifications that must or might appropriately accompany such economic action.

Stock Water Resource in Central Arizona

To give the discussion as much realism as possible, the economically prosperous agricultural area of central Arizona (the Salt, Gila, and Lower Santa Cruz River valleys in Maricopa and Pinal counties which includes Phoenix and its satellite cities having an urban population of more than a half million people) will be used to carry the conceptual analysis.

It is necessary to begin with a verbal model exhibiting the relevant aspects of the area—the resources, the exploiting agriculture, and the eco-

nomic superstructure it generates—relevant, that is, to the conceptual analysis that is my main interest.

I emphasize that this verbal model is realistic but *not* completely real. The relevant physical and economic data are not available for complete realism, but the available data are adequate to give the model sufficient realism for my purpose. I am not concerned that my quantitative data be exact in all their subtle variations but only that they be "in the right ball park," and that my conceptual framework and analyses be warrantable.

The central Arizona example involves an area of crops totaling about 808,000 acres under irrigation. Sufficient "flow resource" water is available to supply the needs of about 150,000 acres of this cropped area. The water demands of the remaining 658,000 acres must be met by pumping from the "stock resource" that lies beneath the area. Withdrawal of water from the stock now amounts to about 3½ million acre-feet per year (a small part of which is used nonagriculturally which we can ignore) or about 5½ feet per crop acre per year.

The volume of water in the stock is not known but two facts about it are known: (1) that its level below the surface has been declining since the 1930's and with increasing rapidity since 1952, the rate of decline since 1952 having varied by subareas from little or none to as much as 14 feet per year and averaging 6½ feet per year over the area as a whole; and (2) that its present (static head) level below the surface varies likewise by subareas from as little as 70 to as much as 322 feet averaging 183 feet for the area as a whole.

This leads immediately to the first question often asked, "How long before the wells will run dry?" The answer isn't known because the topographic configuration of the geologic vessel that holds this water fund is but imperfectly known. However, the question is of only geologic, not economic, importance. Enough is known about the basin to warrant the assumption that little or no agriculture will cease because "the well will run dry," but rather because the water will become too expensive as the depth reaches the limit of economic pumping for agricultural uses. The economic question then is, rather, "at what depth does the water become too expensive for agriculture and when will that depth be reached?" This question can be answered, granted certain assumptions.

For simplicity, let us assume about the future that there will be no change in:

(1) technology of crop production or pumping,
(2) relationship among prices relevant to the analysis, and
(3) scale of farms.

These assumptions remove the dynamics of time from our problem

and permit us to project from current economic and technological relations. These variables will creep back into our analysis later in the disguise of a discount rate.

Let us further assume for simplicity that:

(1) the water yielding efficiency of the aquifer will remain constant with depth,

(2) the cost of pumping per foot of lift is a constant amount regardless of depth, and

(3) the only variable affecting net revenue within any one farming system is pumping cost related solely to height of water lift.

Currently agriculture in the area generates about $100 of net per acre to pay for water. This is the amount above operating outlays, current real estate taxes (which I retain as a charge against agriculture to represent the local Government demand for revenue), and opportunity charges for management, operator and family labor, and interest on nonreal estate investment. Under our assumptions, we can project this "net" indefinitely into the future. Such a "composite acre" produces a combination of cotton, feed grains (barley and sorghum double cropped) and alfalfa and will require under present practice about 5½ acre-feet of water per year. Present total costs of pumping are about 4¢ per acre-foot per foot of lift. If we ignore the increasing cost (decreasing efficiencies) of pumping with greater lifts, it is simple arithmetic that the breakeven point for lifting water under this system will be

$$\frac{100}{5.5 \times .04} = 455 \text{ feet.}$$

However, sketchy evidence indicates that the application of water can be reduced ⅓ with a consequent lowering of yields and net revenue to pay for water but with an *increase* in the net revenue produced per acre-foot of water applied. If 3⅔ acre-feet are applied per acre, net revenue for water will drop to $75 per acre. But at the same pumping cost of 4¢ per acre-foot of lift, we note that the breakeven depth for pumping now becomes 511 feet, an increase of about 50 feet.

$$\left(\frac{75}{3\frac{2}{3} \times .04} = 511\right)$$

One other element is required, the present depth to water and the rate of increase in that depth. Although these facts vary from locality to locality, again for simplicity, let us assume that they are everywhere the same as the area average, viz., 183 feet pumping lift (static head) currently (1960) increasing at the rate of 6½ feet per year.

Knowing the breakeven depth of water, present depth, and annual rate of decline in the water level, it is again simple arithmetic to de-

termine that the economic length of life of agriculture in the area, if present conditions persist, will be 42 years from 1960 (455 feet less 183 feet divided by 6½ feet per year = 42 years).

The above calculation presumes that farmers will continue applying 5⅝ acre-feet per acre. However, the first deduction we can draw from our model (assuming economic rationality) is that at some point in time it will be economic to the entrepreneur to reduce water applications to 3⅜ acre-feet. A bit of arithmetic will reveal that at a depth to water of 342 feet (or a cost of $13.68 per acre-foot) net returns per acre for water will be the same ($25) whether 5⅛ or 3⅜ acre-feet are used. At depths greater than 342 feet, it will be economic to use 3⅜ acre-feet per acre. This depth will be reached in 24 years (342 feet less 183 feet divided by 6¼ feet per year = 24 years). But upon reducing withdrawal from the stock by one-third to 3⅜ acre-feet per year, the length of economic life of the stock is increased. In fact, after the 24th year, the one-third reduction in water withdrawal which will reduce decline in the water level from 6¼ feet to 4⅛ feet per year and will permit 39 instead of 18 additional years of economic life (511 feet less 342 feet divided by 4⅛ feet per year = 39 years). Thus, if economic rationality prevails, the economic length of life of agriculture in the area will be 63 years (24 years at 5⅛ acre-feet per acre and 39 years at 3⅜ acre-feet per acre).

These outcomes all presume continuance of present relevant institutions. Under them, no additional land can be brought into use in the area by development of additional wells and no present irrigator is restrained in any way by social regulation as to the amount of his water withdrawals.

Under the conditions described, the economic life of irrigated agriculture in the area will be 63 years. If we were dealing with a mineral lode or an oil pool, one might logically ask, "So what? When the stock is exhausted that is the end of it, and there'll be just one more 'ghost town' added to those western 'tourist attractions'." But it *does* make some difference *when* the end of the stock will be reached—whether and to what degree it shall be sooner or later—and it also makes some difference whether, how much, and at what cost flow resource water can be "imported" to supplement the stock.

These, then, are the two questions I wish to examine briefly in this paper:

(1) In the absence of an available replacement flow, when will the economic limit of agricultural exploitation of the stock resource be reached, subject only to extrepreneurial choice relative to maximized net returns under, first, present institutional arrangements, designed to maximize returns from water use in the short-run, and second, under modified insti-

tutions designed to maximize returns to the water stock in the long-run.

(2) Given the availability of a replacement flow, what is its value as a replacement, and what, if any, effect does it have on the value and use of the stock and on existing institutions?

Timing of Stock Water Exhaustion for Agriculture

We can confine our consideration of the timing problem to the economics of the use of the water resource by agriculture. We can do this because empirical evidence warrants the reasonableness of the presumption that the stock water resource in central Arizona will not be physically exhausted by agricultural exploitation. The steadily deepening depth from which it must be pumped will impose an economic limit on its use by agriculture at that depth at which the water becomes too expensive for any presently foreseen agricultural use. Many uses alternative to agriculture common to central Arizona can pay greatly higher costs for water than can agriculture and, in the aggregate, will use greatly reduced aggregate quantities. Because agriculture will not physically exhaust the stock and because alternative users can pay significantly higher costs for water, unrestrained depletion of the stock by agriculture does not and will not restrict the use of the stock by other users during economically relevant future time periods.

When, as under present ground water institutions in Arizona, one individual's non-use of any part of the stock does not assure him of any right to its use by himself at some future date, the individual acts as if the value of the stock, while in the ground reservoir, is zero. This results in decisions that maximize returns to the stock from year to year without reference to later years, thus maximizing returns in the short-run both to individual users and to the community.

It might well be that if irrigators (as a group), or if the community as a whole, had the option they might wish to refrain from withdrawing some of the stock of water from the bank this year in order to "save it" for use in some later year. In order to make this choice effective, institutional modification that will insure nonuse of the "saved" water until the intended year will be necessary. It is, of course, impossible to earmark each individual's saving of water in order to insure his individual opportunity to gain (or lose) from his individual act of deferment. Because water saved by an individual act commingles with the common stock and can be withdrawn by any other sharer in the common water account, the act of deferment must be a group or social act of choice (if it is not to be a dictatorial one). To be a group or social choice involves change in existing water law such that withdrawals by individual irrigators from the common water stock are restricted to that amount annually which

group choice believes will maximize returns from the stock resource over time.

Let us consider then, what we, as economists, might have to offer a group considering this choice. Our offer would consist, first of a conceptual analytical model by which the relevant empirical data would be specified, ordered, and quantified; second, of the specification of an economic choice criterion; third, of skills, if wanted, in gathering the relevant empirical data, applying the analytical model and deriving the range of values of the choice criterion; and, fourth, of analysis of the economic impact of existing institutions and suggestions concerning institutional modifications to attain alternative economic ends. In this brief paper we can give time only to a consideration of the conceptual model, applying to it a limited amount of simplified empirical data from central Arizona in order to give realism to the discussion.

The economic problem is one of factor-factor substitution in which the factor "water" in the present interval of time is a different factor than the same water in some future interval. The substitution problem is to determine at which time interval the value of the water's product at the instant when choice must be made to use or not to use it is the greatest. In form the model is a discount model—discounting alternative streams of income arising from alternative rates of use of the water stock to determine the magnitudes of their present values.

The elements in this discount model are (1) the net return per acre-foot of water used (after all outlays and opportunity costs are met) for each year from the present until the net becomes zero due to increasing costs of capture; the net return for each year must be that amount which is a maximum among all net returns possible that year from alternative productive systems (as the cost of water due to increasing pumping lifts increases, this maximum net will fall, but not proportionately to the increase in its cost); (2) an appropriate discount rate reflecting (a) the choosers' opportunity costs for their alternative investment opportunities, (b) their "time preference rates," and (c) their evaluation of the uncertainties of the future; (3) the present worth of each of the discounted alternative streams of net returns; and (4) the number of years over which the life of the agriculture will extend given the economic rate of depletion implicit in the maximization of the annual net returns.

The choice criterion of the model may be expressed either as (1) that stream of net returns which among all possible streams is a maximum present worth when discounted and summed, or (2) the choice criterion may be expressed as that rate of return which causes the present value of the increased and extended net income stream to be equal to the present value of the net income stream foregone due to enforced water sav-

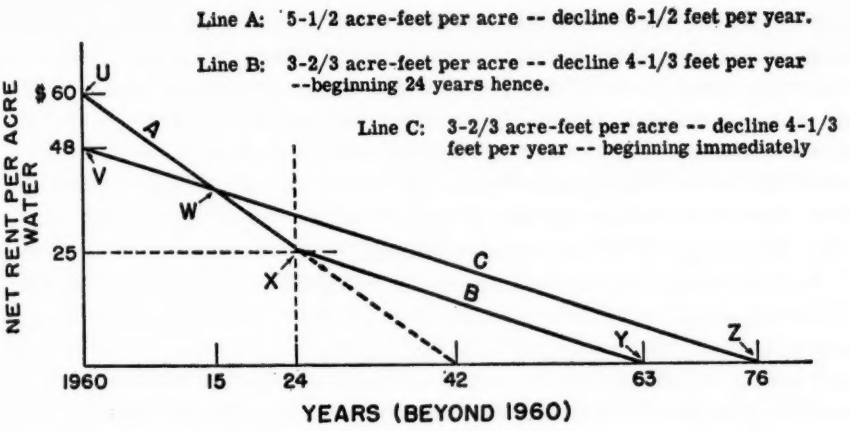


CHART I. STREAMS OF NET RENTS PER ACRE FOR GROUND WATER WITH DIFFERENT AMOUNTS OF WATER APPLIED PER ACRE.

ing, choice going to that stream for which this rate is (a) greater than some minimum demanded by the choosers and (b) a maximum.

Now, let's apply this model to some simple but realistic data of central Arizona ground water conditions and see what it yields.

Chart I illustrates the analysis in geometric form. It could also be shown in functional equations and could probably be most readily determined by a linear programming solution. It begins with the year 1960 when the water depth is 183 feet. At this depth, 5½ acre-feet per acre are applied, the water level drops 6½ feet per year and the net return (i.e., net rent) to ground-water is $60 per acre ($100 generated per acre to pay for water less 183 feet × 4¢ × 5½ acre-feet = $60 per acre). Line A describes the decline in this net rent from year to year as the water level recedes.

Line B describes the transition, after the 24th year, to reduced water applications of 3⅔ acre-feet per acre, the lesser rate of decline in the net revenue at this lesser rate of withdrawal, and the extension of economic life to the 63rd year. (It is probable, but empirical evidence is not available to test the probability, that other reduced rates of withdrawal between 5½ and 3⅔ acre-feet per acre are economic but that 3⅔ acre-feet probably is the economic minimum. To the extent this is true, the sharp discontinuity between lines A and B at "X" in reality will be a smooth curve.)

Lines A and B portray conditions as they likely will unfold under our simplified assumptions and under present institutions that permit only individual entrepreneurial decision making. Let us now, then, consider whether it might be economic by institutional modification to restrict the

use of the stock resource by one-third to 3⅝ acre-feet per acre immediately rather than wait for economic forces to bring about the change in 24 years. Line C in Chart I shows the result. Reducing water withdrawals immediately by one-third to 3⅝ acre-feet per acre extends the life of the industry by 13 years to 76 years and increases net revenue from the 15th to the 76th year at the sacrifice of income from year zero to the 15th year. It is evident that the polygon WXYZ (revenue gained) is larger than the triangle UVW (revenue sacrificed).

But revenue gained in the future is not as valuable as revenue foresworn today for a variety of reasons enumerated earlier and summed up in the concept of the discount rate. One can apply the notion of the discount rate in one of two ways to quantify the choice criterion. The magnitude of the appropriate discount rate must be empirically determined, but having determined it, it can be applied appropriately to the succession of annual incomes that comprises area UVW, and, by summing them, the present value of the revenue sacrificed will be known. Then by applying the same rate to the incomes comprising the area WXYZ, and by summing them, the present value of the revenue gained will also be known. If one takes an 8 percent discount rate as being reasonable, the present worth of the losses is $54.57 whereas the present worth of the gains is $20.13. Obviously, at 8 percent, the gains by no means offset the losses.

The other form of the choice criterion is to find that rate of discount which will cause the present values of areas UVW and WXYZ to be equal. If that rate is in excess of an acceptable rate, the sacrifice is economically preferable (if less than that desired rate, the sacrifice "isn't worth it," economically). Carrying out these calculations, we find that the present value of the stream of net rent sacrificed (area UVW) is equal to the present value of the stream gained (WXYZ) at a discount rate of 4¼ percent (approximately). In other words, if the discount on the future expressed by the irrigator entrepreneurs is 4¼ percent or less (which I doubt), it will be economically advantageous to them as a group (in the long run) to be required by the group to save one-third of their present stock water withdrawals for distant future use. At rates above 4¼ percent, such group saving will not be economic to the irrigator entrepreneurs.

Such evidence, when and if validated empirically, would indicate that it would not be economically acceptable to entrepreneurs to require them to save the water stock at this time.

Even though the present value of the increase in income from group saving of stock water would not be economically acceptable to the irrigators, might it be economic to the aggregate community within which the irrigators live? The group decision to save or not to save will be made

by the aggregate community and not by the irrigators as a group alone. Would it be to the economic advantage of the aggregate community to force the irrigators to save stock water contrary to their economic interest as irrigators?

As the water level deepens, pumping costs of water will rise as we have seen, and personal income generated in agriculture will decline. From this, it might be deduced that the rising cost of water will thus cause a decline in local aggregate personal income. But such need not be the case. Agricultural incomes will decline, it is true. Their decline will be a direct reflection of increasing costs of water. But these increased outlays for water will represent local spendings of agricultural revenues as they did previous to the decrease in net earnings. These outlays will go for somewhat different things and will take a somewhat different course in their meanderings through the local economy. But that they will have any less (or more) power to generate aggregate personal income in the community is by no means clear. It seems as reasonable to proceed at this time on the assumption that they don't as that they do. If this be true, there will be no decline in aggregate local personal income resulting from the continuous decline in water levels, except as irrigators reduce applications per acre and until the cost of water reaches such a level that it pays no longer to use it in agriculture at all and production ceases farm by farm.

In this brief examination of the problem, we can't proceed farm by farm. But if we take the area as a whole and the average condition of the average farm, we have determined that 342 and 511 feet of lift are the points of critical cost and have projected the timing of reduced output and of final agricultural abandonment as 24 and 63 years hence. This is the critical schedule of events so far as the area's aggregate personal income level is concerned for when the area reaches the 342 and 511 foot depths and reduces and finally ceases agricultural production, the community will no longer feel the annual generative impact on its income created, first, by production from 1.2 million acre-feet of water not pumped and, later by the production from the full 3½ million acre-feet now being used. On the face of it, it looks plausible that the local economy facing the inexorable loss of this income might consider it profitable to require the irrigator users to reduce their use by one-third to 3⅝ acre-feet per acre and extend the economic life of the agricultural based sector of the community by 13 to 76 years. But such doesn't seem to be the case. Recall that the community income arising from agriculture is a multiple of the gross product value (which for our purposes we can take to be equivalent to gross expenditures) generated in agriculture and that the annual magnitude of this value will be constant at any given

level of water application per acre but will decline if water application per acre is reduced. Assume (on the basis of sketchy evidence) that aggregate agricultural income (expenditures) will decline by one-sixth when water applications are reduced by one-third but that economic life of agricultural based income in the area will be extended thereby for 13 years. However, the present value of the income gained from the 63rd to the 76th year will not equal the present value of the income sacrificed from year zero through the 24th year except at discount rates of 1¾ percent and lower.

It is generally presumed that the social or community rate of time preference in such situations is lower than the private, entrepreneurial rate. The reasons usually advanced in support of this presumption are well known and need not be gone into here. However, I would be greatly surprised if the community rate in this situation were as low as 1¾ percent. One would conclude, therefore, from such data that there is no compelling economic reason why those parts of the community whose incomes are signficantly dependent on agriculturally generated expenditures would wish to force water saving on the irrigators at this time. The probable difference in discount rates as viewed by the irrigator entrepreneurs on the one hand and by the community on the other could, very well, under appropriate circumstances cause opposed conclusions to be reached by the two groups. Out of such stuff does vigorous conflict grow.

There are, however, other economic as well as non-economic reasons why the community as a whole might wish to delay final exhaustion of agricultural irrigation in the area even though doing so "doesn't pay" in the rigorously simplified sense described above. There is not time to examine these further reasons here.

Value of a Replacement Flow of Water

Given the availability of a flow resource of water, what are the economic market and institutional dimensions by which policy makers might decide as to the reasonableness of "going after it?" In central Arizona, two such possible sources exist—treatment of the watershed from which comes its present flow of water in order to enhance this flow by as much as 275,000 acre-feet and conveyance of Colorado river water to central Arizona by pump and gravity in an amount possibly as great as one million acre-feet annually. Together, they will provide 1.83 acre-feet per acre of flow water for each presently cropped acre now dependent on stock water.

Note two things: (1) both of these sources together amount to no more than 35 percent of the current overdraft on the water stock, and (2) cur-

tailment of agricultural activity in the area is inevitable (given our assumptions and the discovery of no other sizeable flows of available water). The question then becomes: what can the farmers (the direct water users) and/or the community (whose income depends in part on the agricultural substructure) "bid" for replacement water in purely economic terms or, in their bidding for such water, what is their economic "breakeven" point beyond which, if they go, they do so for intangible non-economic reasons?

Chart II shows the conditions of this analysis. Two possible alternatives (among many) are shown: (1) require reduction of stock withdrawal to 3⅝ acre-feet per acre and use the 1.83 acre-feet of new flow water to permit continued application of the current 5½ acre-feet per acre (line A), or (2) curtail *aggregate* water application to 3⅝ acre-feet per acre, providing 1.83 acre-feet of this amount from flow sources thus curtailing stock withdrawal to 1.83 acre-feet per acre (line B).

Alternatives (lines) A and B each embracing the addition of 1.83 acre-feet per acre of flow water are each compared to present conditions (line C) and possible modified conditions (line B′) each of the latter without flow water. In other words, Graphs C and D in Chart II compare two institutional circumstances—those under which 1.83 acre-feet per acre of flow water might be made available—with the outcomes now being experienced under present institutional conditions (line C). Graphs A and B in Chart II compare the same two sets of institutional conditions (lines A and B) coincident to introducing flow water with the outcomes expected under conditions of stock water use alone modified by requirements for group saving (line B′).

Let us look first at Graph C. Line A describes the flow of net revenue accruing per acre as net rent to stock water or as net income available per acre to pay for the 1.83 acre-feet of flow water introduced. Line C describes net rent accruing per acre to stock water in the absence of flow water. The institutional restrictions incident to each case are given in the legend. The stream of enhanced net rent to water generated by 1.83 acre-feet per acre of flow water is shown by the area between lines A and C.

One of the significant outcomes to note is the great leverage exerted by an acre-foot of flow water substituted for one of stock water. The acre-foot of flow water has a two-edged influence. It directly reduces pumping costs per acre, the full amount of which accrues to net, an influence that grows larger as water levels fall. And, because water levels fall more slowly, net incomes are extended farther into the future.

At 8 percent time discount, the increased flow of net rent has a present total worth of $168.63 per acre-foot of flow water supplied which, at 8

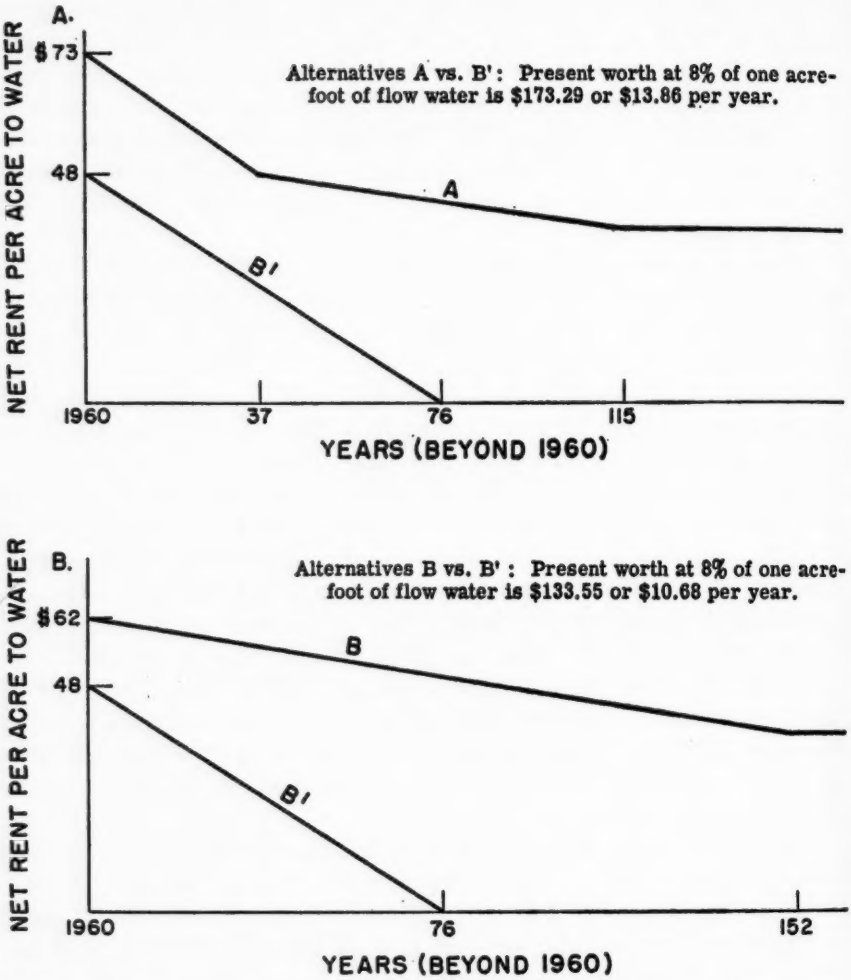
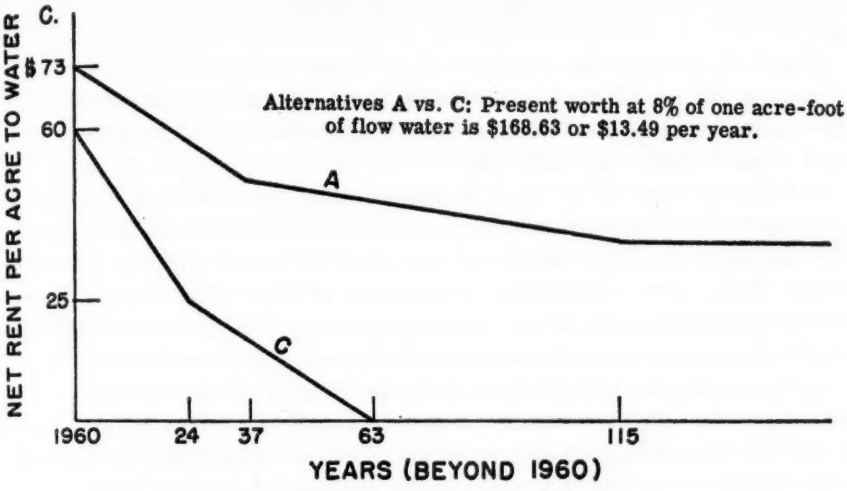


CHART II. COMPARISONS OF ALTERNATIVE STREAMS OF NET RENT ACCRUING TO WATER: 4 SETS OF INSTITUTIONAL RESTRICTIONS ON STOCK WATER WITH AND WITHOUT FLOW ADDED.

Line A: Institutional restraints—maximum permitted use of water per acre is 3⅝ acre-feet of stock water plus 1.83 acre-feet of flow water. Entrepreneurial maximum of use under these restrictions is 5½ acre-feet through the 37th year, 3⅝ acre-feet through the 115th year, then 3⅝ acre-feet of flow water only on ½ the acreage.

Line B: Institutional restraints—maximum permitted use of water per acre is 1.83 acre-feet of stock water per acre plus 1.83 acre-feet of flow water. Entrepreneurial maximum of use under these restraints is 3⅝ acre-feet per acre to 152nd year, then 3⅝ acre-feet of flow water only on one-half the acres.



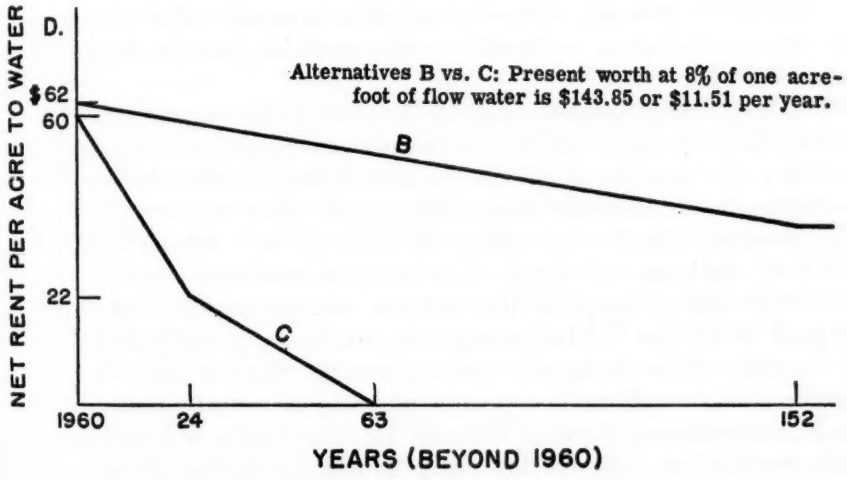


CHART II. CONTINUED.

Line B′: Institutional restraints—maximum permitted use of water per acre is 3⅝ acre-feet of stock water per acre; no flow water available. Entrepreneurial maximum of use under these restraints is to use this maximum until economic exhaustion in the 76th year. (Identical to Line C, Chart 1).

Line C: Institutional restraints—present institutions: no flow water available. Entrepreneurial maximum of use under these restraints is 5⅝ acre-feet of stock water to the 24th year, 3⅝ acre-feet of stock water to economic exhaustion in the 63rd year. (Identical to Line AB, Chart 1).

percent, has an average annual worth of $13.49 per acre-foot in perpetuity.

Graph D portrays the outcome if yet more stringent restrictions are placed on the use of stock water. With these alternatives, an acre-foot of flow water has a present worth of $143.85 at 8 percent, or an average annual worth in perpetuity of $11.51.

In Graphs A and B of Chart II, the comparison is between two levels of restriction on the use of stock water in combination with flow water, the alternative being a restricted use of stock water without the flow water. Under these conditions, an acre-foot of flow water has a present worth of $173.29 or $13.86 per year in perpetuity (Graph A) or of $133.55 or $10.68 per year in perpetuity (Graph B), both at 8 percent discount.

Such calculations indicate that (if 8 percent is a realistic rate) irrigators could pay the highest price for flow water under alternatives in Graph A and the second highest amount under alternatives in Graph C. A corollary conclusion is that it would not be economical for the irrigators to further conserve stock water by reducing withdrawals to 1.83 acre-feet per acre in the presence of flow water just as it would not be economical to conserve stock water without flow water available. (See the conclusions from Chart I.)

The foregoing calculations indicate how much the irrigator can afford to pay for flow water under various restrictions on stock water. If it should prove possible to obtain the flow water at prices below these ceiling amounts, additional rents to the ground water stock are generated. The breakeven depth of pumping was taken in these calculations to be 511 feet, the breakeven depth under present conditions of stock water use. If the full ceiling price (the total rent accruing to flow water) must be paid for it, then 511 feet remains the breakeven pumping depth. But if the price of flow water is below this amount, then an additional rent accrues to the stock water, a greater pumping cost can be met, and the breakeven pumping depth is lowered. In other words, a less than full value productivity price for flow water "subsidizes" the further extraction of stock water. The reverse conditions will arise if more than the indicated full rent to flow water must be paid for it. Under these circumstances, pumping costs must be saved to pay "high" flow water charges and the breakeven depth is raised. The latter circumstance can arise, however, only if institutional restrictions on stock water extraction are applied to prevent the irrigator from substituting cheaper stock water for the more expensive flow water by not accepting delivery of the latter.

There are other alternative patterns of use of the additional or replacement flow resource, but these alternatives are sufficient to show the nature of the analysis.

But, as discussed in a previous connection, the imported flow water will have a value to the community through its influence in maintaining the flow of agricultural expenditures, which in turn generates non-agriculture incomes in the local area. For example, take the conditions described in Graph C of Chart II. The full, undiminished flow of agricultural output will be extended by 13 years—from the 24th through the 37th years; the flow of output, reduced by 1/6, will be extended 52 years —from the 63rd through the 115th year; and ½ of this level of gross agricultural output will continue indefinitely—it was totally absent beyond the 63rd year under no flow water conditions. What is this volume of added revenue "worth" as a base for personal income in the community?

Each 1.83 acre-feet of flow water imported into this area is responsible for these extensions in the several periods of income generating agricultural output. However, the data presently available do not permit determination of even approximate values of this extra water to the community. To be able to do so, it would be necessary to know what magnitude of unliquidated capital assets will remain as agricultural output declines and finally ceases and what magnitude of net rents accruing to non-agricultural factors (returns above opportunity costs) are (or will be) generated by each $1 of agricultural gross expenditure (gross output). Insofar as non-agricultural income generation is concerned, it is only net returns received by non-agricultural factors above their opportunity costs (rents) that can be claimed by the 1.83 acre-feet per acre of flow water brought into the area. We do not have even an inkling as to the magnitude of this figure. In line with the realistic data used throughout this analysis, we can estimate gross output (gross expenditure) from the agricultural sector of the area as being about $275 per acre. There is evidence to indicate that this level of gross output will be reduced by 1/6 when water applications per acre are reduced by ¼. Insofar as these data may be correct, they reveal that gross output will be $46 per acre higher from the 24th through the 37th years; $229 per acre more from the 63rd through 115th years, and will continue at ½ this level or $115 from the 116th year to infinity. We can calculate the present worth (and average annual worth) per acre of this enhanced stream of agricultural gross output but we do not know how much net rent to factors outside of agriculture will be generated in the community by each $1 of this agricultural output hence we cannot, from data available to us, determine the value of imported flow water to the community outside of agriculture.

If this figure were known, it would be possible to determine how much the community outside of agriculture could afford to pay per acre-foot for this imported flow water. For example, the average annual worth of the increased flow of gross agricultural output (at 8 percent) under conditions of Graph C (Chart II) is $3.48 per acre-foot of imported flow

water. If the value of net rents accruing to all non-agricultural factor is 20¢ for each $1 of gross agricultural output, then the average annual worth of each acre-foot of flow water is 70¢ ($3.48 × 20¢).

Such data, if found to be correct, would lead to the conclusion that the community could (at 8 percent discount) pay up to 70¢ per acre-foot for flow water under the conditions of Graph C. The irrigators can afford to pay up to $13.49 per acre-foot for this water. Between the "direct beneficiaries" and the "indirect (community)" beneficiaries, $14.19 ($13.49 + 70¢) per acre could be paid for flow water (Graph C conditions) or a range of other amounts than $14.19 per acre-foot could be shared in the ratio of $13.49 : 70¢.

In the above calculations, the discount rate of 8 percent was used in both entrepreneurial and public valuing. Should—as is likely—the public rate prove to be lower than the irrigator entrepreneurial rate then the public's share in the imported flow water cost could be proportionately increased. This is particularly pertinent when one recalls the numerous non-market values both economic and non-economic involved of which much the larger part, I am sure, are in the community's more than the irrigators' interest.

Under conditions of Graph D the community will suffer immediate reduction of one-sixth in income generation from agriculture which will extend over 24 years, but this level of income will extend beyond the 63rd year to the 152nd year and one-half of this income level will extend indefinitely beyond that distant year. However, at 8 percent discount, the early sacrifice of income is not even closely recouped by the later gains. (The present worth—at 8 percent—of the sacrifice and gain in gross agricultural output per acre resulting from the importation of 1.83 acre-feet per acre of flow water is $484.32 and $22.43 respectively). At discount rates approximating 3½ percent and below, the gains exceed the losses and the community will gain something from the imported flow water and it begins to have some value to the nonagricultural community. There are, however, several other economic as well as noneconomic reasons why the non-agricultural community might feel it to be feasible to pay more than the indicated amounts for imported flow water even though doing so "doesn't pay" in the rigorously simplified sense described above. There is not time to elaborate on these reasons here.

Final Comments

The analyses portrayed above rest on the usual economic premise of rationality concerning current production choices and foresight. Real life is not so simple. Application of the type of analysis shown must include empirical determination of the probable degree of economic rationality

to be expected and of the nature and magnitude of the nonmarket economic values that will intrude. It will also require empirical determination of the magnitudes of those elements that compose the discount rate. Only when these empirical magnitudes are known will the economic analyses be more than normative prescriptions or illustrations of the use of a conceptual model.

The illustrative values elucidated in this paper have rested on average conditions for the area as a whole. It would be much more pertinent to break down the area into subareas, each of which exhibits uniform conditions of depth to water and rate of its decline. The application of curtailment regulations then could be scheduled over time and could be made to apply only in those subareas where economic considerations indicate the advantage of such curtailment. This would be especially pertinent if, as is likely, the area is in reality a collection of subareas overlying independent stock water basins.

Lastly, the empirical assessment of magnitudes for realistic determination of the values of the choice criterion is a far more complicated business than implied by the breezy off-handedness of the discussion in this paper.

DISCUSSION: THE STOCK RESOURCE VALUE OF WATER

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Professor Kelso has presented an interesting paper in his usual lucid style. He has correctly characterized much of the West's ground water utilization as mining a stock resource. I hope, as he delves further into the new regional water project, he will explore some of the subtilities he acknowledges are glossed over and will extend the numerical computations to cover a wider range of pertinent characteristics. At present, the complexities of basin-wide aggregation are just beginning to show through.

Within his framework of analysis, the discount rate is crucial, if the conclusions are to be related to policy for managing ground water mining on a basin-wide basis. I dare say his 4¾ percent rate is within the range of acceptability of many farm businessmen. For the farm operator, his asset position at any given time will be particularly important. Of course, such a rate is not static and will be influenced by many factors. In fact, we might ask, "What rate is this?" Sometimes, one has the feeling it is comparable to the interest rate, while at other times, it is carrying a heavier burden.

These observations are reenforced after reading of the political turmoil

ground water legislation has caused in Arizona during the last decade and a half. Without precise analysis, the future was discounted, and estimates of the change in incidence of benefits were made. No effective legislative action has been taken.

With importation, management is called for by his assumptions. The original restrictions are shifted since they could not fit into his initial framework. It would explode—particularly as far as acreage is concerned. To forestall this and to follow the assumptions, some management technique would have to be developed whether it is pricing the "imported" water or restricting water use.

Of course, this leads directly to the point that only a very limited number of patterns of use could be examined within the time restrictions of preparing the paper. Other variations should be explored as he indicates. The choice of alternatives will be dependent, in part, upon the flow characteristics of the "imported" water. To take these last two points into account necessitates a relaxation of Professor Kelso's strict assumptions. Without going into several interesting methodological issues, all of the dynamic elements cannot be subsumed adequately into the discount rate. Under today's conditions, intermittence in water supply in arid areas is common, if not usual, thus making seasonal and/or cyclical storage desirable, if not necessary. The alternatives of surface storage, ground water storage, or a combination need to be carefully weighed. If the latter alternative is selected, the management of draft under the conditions postulated would have to be both effective and flexible.

On the other hand, the immediate political obstacles may be so formable to draft management that a physical solution of artificial recharge becomes a practical route. Even so, draft management may have to be instituted at some point, but artificial recharge may be a step preceding its adoption in such situations as he describes.

Another problem Professor Kelso mentions but does not explore is the lack of homogeneity of the ground water reservoir. Basin-wide averages can be notoriously deceptive in such situations. Detailed hydrologic and geologic ground water studies are needed as a basis for economic analysis so that the researcher can tell which "ball park he is in." From the statements presented, one could question whether it is correct to say all of the basin is being mined. Segregating the basin on the basis of transmissibility and other studies may be very fruitful. Water movement still may be relevant even in a mining situation. Pumping cones form areas of depression with variable effects due to the lack of aquifer homogeneity. For these reasons, it may be important to regulate the pattern of draft.

The transition of land and water use from rural to urban may have an effect on the ground water which was not noted. Part of the irrigation

water application returns to the ground water reservoir and frequently serves as an important source for some other locality. But urban return flow is of a different character than that of agriculture. Its reuse is being practiced in a limited number of localities and will, undoubtedly, be more fully investigated in the future. In any event, the location and timing of its return is different, thus affecting the incidence of benefits.

As water becomes more expensive, what is the best way to cut back on utilization? Under the straight assumptions of the model presented, acreage irrigated remained fixed, and the reduction took place in per acre application. This decision is not simple and clear cut. The over-all farming operation must be taken into account. In addition, detailed information on the plant-water relationships needs to be given consideration along with data concerning the opportunities for factor substitution, such as, water, fertilizer, or enclosed systems. It is not clear that the reduction would be a uniform per acre reduction. Of course, this goes directly to the point that the $100 net return per acre available for paying for water is not fixed. The production relationships will affect the return in other ways than just through the cost of water supply. This is central to the economic problem.

Another aspect which is related to the above point deals with the efficiency of application. As water becomes more expensive, application efficiency usually increases over currently standard practices. In most areas of the West, this efficiency can be increased by a significant degree and yield an acceptable return. Of course, this is an aspect of substituting capital for water.

These shifts frequently are accompanied with changes in the cropping pattern. Higher value crops replace lower value crops. The range of cropping alternatives in many arid areas of the southwest is among the broadest, so adjustments are to be expected. In considering the next 25 years, a case could be made that forces will be working to increase the returns function.

Let us turn to an aspect of the economics of ground water mining briefly mentioned a moment ago. In some ways, it is even more crucial than the points previously discussed and, at the same time, more difficult to handle—the economic incidence of basin management programs. The physical character of the basin and the pattern of pumping are important. But these are not the only relationships which affect incidence. Are the current investment programs in the area taking into account the uncertainties of water supply and in what ways? How does land speculation fit into the pattern of growth? Do land values reflect the water limitation of the economy? The incidence of shifting draft to the future is shifting water away from the latest developer and promoter—those put-

ting pressure on land values today. For these groups, the discount rate will be something different than for some of the older established businesses–farming or otherwise. What is the economic–as well as political–interaction among these groups?

Lastly, Professor Kelso does not worry about the nonagricultural uses since they can take care of themselves economically. Without being familiar with the local situation, one wonders whether nonagriculturally oriented businesses are coming in at a faster rate than agriculture is–or is going to decline. This will affect the impact upon the local economy in several ways. For example, if nonagricultural development is taking place faster than agricultural decline, the competitive relationship for water within a basin becomes important in terms of the rate of increase in the depth to water.

The technology assumption, as well as others, has not been mentioned. Each of these play an important part in the dynamic economy of water use. The way they each–and in combination–influence the policy question of basin management needs careful assessment.

WATER QUALITY, A PROBLEM FOR THE ECONOMIST[1]

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IT IS with some diffidence that I approach a problem area which, with respect to private and public investment and to effective public policies, is one of the most significant underdeveloped areas in the economics of natural resources. This is true no less domestically than abroad. In the terminology of my assignment, this is the area of managing the quality of natural resources or, for short, the problem of quality management. I prefer this broader concept to the more usual term "pollution control."

Quality Management in Natural Resource Economics

A few words need to be said about the meaning of quality in this context. It is well known that use of natural resources by man frequently does not involve an irreversible decrease of physical quantities of stocks and flows through consumption and transformation but, rather, a reversible decrease in suitability for *reuse*. For some important resources, such decrease of quality is restored through natural processes—provided that intensity of use is held within certain limits. Regardless of whether quality is restored by natural processes, man can prevent, reduce in degree or duration, or reverse a decrease of quality at the expense of some use benefits foregone or some additional costs incurred; he can do so even if a decrease of quality is due not to his own use but to natural causes, such as erosion and deposition. Thus, the problems of quality management are not merely technological but, to a large extent, economic and political.

Reuse is an especially intriguing problem for the economist because different uses of the same resource commonly have different effects on quality and, in turn, have different quality requirements. Thus, quality management has to deal with a multiple-use problem of a particular sort, namely, with the sequence of different uses over time. Some problems of the quantitative allocation of resources among different uses appear in a new light if differences in quality effects and quality requirements are taken into account.

The economics of quality management are significant problems for many natural resources. This paper is confined to water resources by assignment. A closely similar economic analysis, however, can be applied to other natural resources—especially to soil, air, and recreational resources.

All major water uses, except irrigation, are largely nonconsumptive. This is true for uses by households (domestic), manufacturing, including

[1] Giannini Foundation Paper No. 212.

steam electric plants (industrial), transportation on rivers and canals, recreation (boating, swimming, fishing), hydroelectric plants, and, last but not least, waste disposal. Even in irrigation, less than two-thirds of total water use is consumptive—through evapo-transpiration. In arid and semiarid climates, at least one-third of total water use, and frequently more (depending on its quality and on the soil), is needed for leaching harmful salts into the ground water. Drainage of such ground water through streams and canals is becoming a crucial problem for the continuity of irrigated agriculture. The economic problems created by agricultural pollution are no less important than those created by industrial, domestic, and recreational pollution.

What was just said about quality effects and quality requirements of different uses is applicable especially to water resources. For example, some important industrial uses, such as cooling, have practically no quality requirements, and the quality effects are merely increases of temperature. But other industrial uses, for example, in the chemical industry, and most domestic uses have strict quality requirements, and the quality effects are great. Irrigation use has an intermediate position between these extremes.

In an economics of natural resource that focuses on use rates, on their complementarity, competitiveness, or neutrality in benefits and costs, and, especially, on the time aspects of these relations, reuse is conceptually integrated into the economic analysis. Such an analysis has been presented elsewhere.[2] It may be helpful, however, to restate here the main economic problems and conclusions with explicit reference to water quality management.

Only too often, water is treated in economic analysis as if physical quantities of a homogeneous commodity were under consideration. Concern is expressed over the increasing competition between agricultural and industrial uses even when they have different quality requirements and are, therefore, "noncompeting groups." In input-output analysis, technical coefficients of water use for different sectors—expressing acre-feet of water required per dollar output of product—are developed without taking into account differences among sectors in quality requirements and intersector reuse of water. Aggregate quantities "required" by all sectors are computed on this basis and projected. In linear programming studies of quantitative optima in water development and allocation, problems of waste disposal and reuse are neglected. Although the past and present extent of reuse is one of the least satisfactory parts of water statistics, it is certainly significant, not constant over time, and greatly affected by water policy.

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[2] Ciriacy-Wantrup, S. V., *Resource Conservation, Economics and Policies* (Berkeley: Univ. of Calif. Press, 1952), 395 p.

Referring to problems in quantitative water economics might create the impression that problems of quality management are less amenable to quantitative measurement. Such an impression is not justified. The semantics of the words "quantity" and "quality"—like that of many dichotomies—are unfortunate, and some possible confusion must be guarded against.

The technological aspects of water quality are no less amenable to precise quantitative measurement than the volume, weight, or flow rate usually employed to measure water quantity. Rather, different quantitative dimensions are involved when water quality is considered. These dimensions are measurable with a degree of precision not greatly different from the traditional dimensions. The "new" dimensions are water temperature, dissolved oxygen (D.O.), biochemical oxygen demand (B.O.D.), total dissolved solids (T.D.S.) in parts per million (ppm)—or as milligrams per liter (mg/l)—and many similar ones for particular dissolved solids—such as chlorides, toxins, synthetic organics—that are important for particular kinds of reuse.

Difficulties of quantitative measurement arise frequently when these dimensions are to be evaluated in social economics. If evaluation is one-dimensional, for example, in pecuniary terms, a problem of "quality" is present in the sense that precise quantitative measurement may become meaningless or misleading. This problem of the relevant degree of quantification in science is not peculiar to water quality management; it is present in all attempts to identify social optima in water development and allocation and has been discussed elsewhere.[3] We shall return later to the problems of evaluation in connection with the formulation of policy objectives in water quality management (Section 3).

Time does not permit going into the technological aspects of water quality management. The very complexity of these aspects makes the literature in this field of great interest to the economist. Suffice it to say that a thorough study of the technology of water quality management is a necessary condition for dealing with the economic and political problems associated with them. No attempt is made here to treat these problems exhaustively. They will be ordered according to their relevance for water policy. Emphasis will be placed on the reasons why in a market economy investment in water quality management has an inherent tendency to fall short of a conceptual social optimum and on the possibilities for water policy to remedy this situation.

The first step in this analysis is a study of the incidence of social costs and benefits in water quality management. This is the key economic prob-

[3] Ciriacy-Wantrup, "Projections of Water Requirements in the Economics of Water Policy," *J. Farm Econ.*, Vol. XLIII, No. 2, May 1961, and "Philosophy and Objectives of Watershed Policy," *Economics of Watershed Planning*, ed. Tolley, G. S. and Riggs, F. E. (Ames: Iowa State Univ. Press, 1961).

lem. We shall then proceed to an analysis of how the incidence problem is related to a conceptually and operationally helpful formulation of policy objectives.

Incidence of Social Costs and Benefits in Water Quality Management

In a regulated market economy like that of this country, the extent to which decreases of water quality are taken into account as costs by planning units making production decisions that cause pollution, is determined not by the interplay of economic forces in the market place but by laws and similar social institutions. In other words, if economic forces alone were operative, the social costs of decreases in water quality would not be incident on the polluters but on the pollutees—if you permit. By the same token, the social benefits of pollution abatement would not accrue to the planning unit that could prevent pollution at the source. Water pollution has long been the classical example of real external economies and diseconomies.[4] By "real," I mean externalities that are not merely income transfers among sectors of the economy through offsetting increases and decreases of values due to price changes. At least in degree, real external social costs and benefits are more important in water quality than in water quantity management. Several economic consequences are especially relevant for water policy.

First, at a given state of technological development, individual planning units—industrial firms, farms, households, cities, and public districts—select production functions without regard to the effects of quality, quantity, and timing of their discharge on the quality of receiving water resources, such as ground water, streams, lakes, and tide water. Timing needs to be stressed because, owing to variations of flow rate, temperature, dissolved oxygen, turbidity, and other conditions, water resources vary over time in their capacity to receive discharge. The term "production function" is interpreted here broadly. Households are regarded as processing firms using water for production. Some household production functions, for example, those involving detergents, have significant effects on the quality of discharge. Similarly, city sewer departments and public sewer districts may be regarded as processing firms with alternative production functions available to them for collecting, treating, and discharging sewage.

Second, and more important over time, planning units have no economic incentive to undertake and support research with the objective of pushing technological change into directions that would help to control their discharge in the interest of reuse by others. Experience in recent decades indicates that the potentialities for technological change in this

[4] The term "spill-over effects" that has become popular recently adds nothing to the analysis.

area are great. The technology of waste treatment in this country and abroad has advanced in spite of a relatively small over-all research effort. One important direction of technological change which should be emphasized in the future is finding substitutes for especially harmful but stable materials that enter discharge. Some detergents and pesticides are examples. The industries producing these are on the front line of technological change and, in the past, have reacted effectively when private or public needs called for the development of new products. Another important direction of technological change in the future is reclamation of wastes into salable products. Fuel, fertilizer, feed, and fish are important by-products of modern sewage treatment plants in some European countries. A study we are making of water policy in Soviet Russia points to economic incentives through administered prices and large resulting investments for producing ethyl alcohol from the wastes of the pulp and paper industry.[5] Many wastes of the chemical and oil industries could be reclaimed with proper incentives. Pollution abatement is a joint product. All these industries are characterized by rapid technological change.

Third, a given standard of water quality which, as discussed in detail below, may be adopted as a policy objective for the water resources receiving discharge is not likely to be realized with minimum total social costs if quality management is not applied at the source; that is, *before* discharge. Technologically, the same quality standard can be realized through dilution and treatment *after* discharge. As an extreme, individual reusers can refine water at their intake to any degree of quality desired. But minimum total social cost combinations of technological alternatives for realizing a given standard of quality are usually unobtainable if discharge remains uncontrolled.

The three foregoing consequences could be avoided by inducing planning units to take external social costs into account in their decision making. The many laws and regulations that apply to quality, quantity, and timing of discharge have this objective. Economic soundness of this policy objective of water quality management depends on several important conditions.

First, when regulations regarding discharge are imposed in order to force planning units to take external costs into account, external benefits produced by such units should be considered. It is possible, for example, that costs necessitated by legal requirements regarding quality of discharge prevent a pulp and paper industry from locating in a certain region or bring about migration to other regions or force it out of business altogether. If such an industry creates external *net* economies, it may be in the interest of regional or national welfare that an appropriate portion

[5] This study is being undertaken by M. Gucovsky under a grant from Resources for the Future, Inc.

of the costs of discharge control be taken over by the public.

Second, the sound policy objective of forcing planning units to take external costs into account does not necessarily mean that each planning unit should be forced to control its own discharge. For some industrial firms and some farms, for example, dairies, this approach may be the one with minimum total social costs. For other industrial firms and most farms, the economies of scale of treatment plants and economies based on technological advantages in treating a discharge-mix from different industries will argue for unified collection and treatment at strategically located points of a river basin. In irrigated agriculture, large master drains known as wasteways take the place of unified collection and treatment of city sewage.[6] In unified water quality management, the economic incentive of internal costs may still be realized by distributing costs among individual planning units through a sewer service rate system based on studies of the effects of quantity, quality, and timing of individual discharges on the costs of collection, treatment, and disposal. Such rate systems exist in this country and abroad.[7] They deserve further refinement and general application. Frequent or, better still, continuous checking of discharges and of the quality of the receiving water resources is a prerequisite of an effective application and adjustment over time of such rate systems. A water intelligence service is one of the most important components of water quality management. Electronic recording and transmitting instruments are effective tools of such a service.[8] For households, however, checking of individual discharges would be too expensive. For households, therefore, economic incentives to change production functions must be applied at the manufacture and distribution stages. Several countries—among them, Great Britain and West Germany —are considering prohibition of manufacturing, or at least of domestic distribution, of some detergents.

[6] Such a master drain is being proposed for the San Joaquin Valley in Calif. See: Calif., Dept. of Water Resources, Div. of Resources Planning, *Lower San Joaquin Valley Water Quality Investigation*, Div. of Resources Planning Bul. No. 89 (Sacramento, Dec. 1960).

[7] Laboon, John F. and Dougherty R. J., "Setting Fair Sewer Services Rates for Sewage and Industrial Wastes," *Wastes Engineering*, Vol. 31, No. 2, Feb. 1960, pp. 92-94 and 113. An even more elaborate rate system than the one discussed in this article for Allegheny County in Pa. is in use by the "Ruhrverband," the Metropolitan Water District responsible for the unified quality and quantity management of the water resources of the Ruhr in West Germany.

[8] To illustrate, the 1960 annual report of the Ohio River Valley Water Sanitation Commission mentions that they will have 40 electronic instruments located along the Ohio River. These will record and report data on dissolved oxygen, chloride content, hydrogen ion concentration, specific conductants, biochemical oxygen demand, temperature, and solar radiation. The Ohio River Valley Water Sanitation Commission is a regional authority in which nine states are cooperating. See: Ohio River Valley Water Sanitation Commission, *Chronicle of the 12th Year, 1960* (Cincinnati, 1961), p. 15.

Third, when attempting to force planning units to take external costs into account, one must recognize that cities, counties, public districts, and State and Federal agencies are in a different economic and legal position from private firms and farms with respect to decision making. Decision making in private planning units is sensitive to economic and legal incentives. The management of a city or county sewer department, on the other hand, may have the best understanding and intention to cooperate in the elimination of external costs, but investment decisions depend on city and county Governments. Financing of investment in pollution abatement is generally by bond issues, which usually require a two-thirds majority of the electorate. Local governments and electorates are not easily convinced that taxes should be increased for public resource development, the benefits of which will largely accrue to other communities. Furthermore, it is difficult to enforce laws and regulations against public bodies.[9] Some courts, for example, treat the right of a municipality to use streams for waste disposal as a public right that has priority over other water uses.[10] The system which is developing, therefore, in this country and abroad, is one of large-scale Federal and State grants, wherever possible on a matching basis, and of low-interest loans, to help local governments reduce on a voluntary basis the external costs of pollution caused by their jurisdictions.[11] Potentially, such Federal and State grants and loans could be used to coordinate quality management throughout a river basin. Efficiency in Government expenditures requires such coordination.

The last point leads me to a conclusion—or prediction if you like—which follows from the analysis of problems of incidence of costs and benefits just presented. I should like to submit that water quality management will become a stronger force toward unified river basin develop-

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[9] The same problem exists in air pollution. California had to enact a special law in 1961 to give the Bay Area Air Pollution Control District authority over State and municipal jurisdictions.

[10] Beuscher mentions a Wisconsin case in which an irrigation permit was denied because stream flow might be reduced to a point where it was not sufficient to dilute sewage from a downstream municipality. Beuscher, J. H., "Appropriation Water Law Elements in Riparian Doctrine States," *Buffalo Law Review*, Vol. 10, no. 3, Spring 1961.

[11] California started this system with a $90 million grant in 1946 under the Construction and Employment Act. Under later legislation, a Water Pollution Control Fund was set up for the purpose of low-interest loans. See: Calif., *Statutes of Calif.* (1946-1947), pp. 30-39, "Construction and Employment Act"; Calif., *Statutes of Calif.* (1949), pp. 2793, 2794; Calif., *Stautes of Calif.* (1953), pp. 1361-1362.

In the Federal government, the 1956 Water Pollution Control Act was amended this year and appropriations increased to $570 million. This bill fixes the Federal share of any single antipollution project at $600,000 or 30 percent of the total cost, whichever is smaller. See: U. S., Public Laws, Statutes, etc., an act to amend the Federal Water Pollution Control Act to provide for a more effective program of water pollution control, Washington, D.C., July 24, 1961 (Public Law 87-88).

ment than water quantity management has proved up to now. In water quantity management, the incidence of costs and benefits is such that it is economical for groups of beneficiaries to undertake partial development themselves. Most of California water development took place on this basis. In water quality management, the polluters as well as the beneficiaries of pollution abatement must participate. On the other hand, through the economics of dilution, water quality management is intimately related to quantity management, especially storage. The most completely unified river basin I know of—that of the Ruhr, comprising the industrial heartland of Germany—is one with quantitatively abundant water resources in a humid region. The driving force for unified development came from the quality side. Some aspects of this example have a bearing on the formulation of policy objectives in water quality management. This problem will be considered next.

Formulation of Policy Objectives in Water Quality Management

At first glance, one might conclude from our discussion of the incidence problem that policy objectives in water quality management might be conceptualized as "the optimum waste disposal system" taking account of externalities, of alternatives in abatement, of interdependence with water quantity management, of cyclical and stochastic aspects, of uncertainty, and of changes over time in all of these elements. The term "watershed firm" or "basin firm" has become popular for the fictitious entity that optimizes. Some authors contend that the optimum waste disposal system can be quantitatively specified through formal programming techniques.

One may wonder a little about the helpfulness of such a formulation. The conclusion reached above, that the need for water quality management is a strong force toward unified river basin development, does not mean that policy objectives should be formulated within a basin framework. The two major policy objectives mentioned above—changes of industrial, agricultural, and household production functions and changes in the state of technology over time—transcend a river basin.

An optimizing basin firm is not a helpful construct for conceptualizing the relations between water policy and individual planning units. The basin firm cannot, even conceptually, take the place of individual planning units as optimizers. Neither can the basin firm undertake to optimize changes in technology in a conceptually meaningful way.[12]

In the past, economic incentives have operated to *increase* pollution (Section 2). Even if this influence were reversed through water policy along the lines suggested, there would be no assurance that all plan-

[12] In programming, technology is included in the constraints and not in the objective functions.

ning units would respond to the same extent and at the same time. Serious types of pollution are caused by a single polluter sometimes during a very short time. In addition to this uncertainty, a change of economic incentives will increase uncertainties related to technological change. Thus, while a reversal of the direction in which economic incentives have operated in the past can be expected to solve a major part of the pollution problem over time, these incentives must be applied in such a way that a definite *minimum* response by individual planning units is assured. This, as we know, can be achieved through regulations regarding quantity, quality, and timing of individual discharges, through prohibition of certain production functions, through unified collection and treatment of wastes with appropriate distribution of costs, or through a combination of all three.

The question now arises: how far should water policy go with these measures? In other words, what is the particular minimum standard of quality in the receiving water that should be the policy objective? At present, this standard is determined on the basis of considerations in the fields of public health, sanitary engineering, and other applied natural sciences. Economic considerations come in by the back door in the political process through which quality standards are enacted in laws and regulations.

There is also some argument among experts in public health and sanitary engineering on whether emphasis should be on standards of quality in individual discharges or on standards of quality in the receiving water. Both types of standards are needed. As previously mentioned (Section 2), the former are usually the most economical means of obtaining the latter. If treatment is applied after discharge, varying degrees of treatment will be needed to conform with stream flow variations. Under these conditions, treatment plants cannot operate at maximum efficiency. For example, a plant designed to remove 90 percent of the B.O.D. will not operate efficiently when removing 50 percent of the B.O.D., and, of course, the reverse is impossible. Yet, variations in stream flow will be considerable, whereas the waste being treated will probably not vary greatly in degree of pollution at a particular treatment plant. Dilution, which has been the major tool of pollution abatement in the past, is of decreasing importance as the pollution problem increases. In the future, emphasis should be placed on other alternatives. This would avoid many of the problems posed by variations in stream flow.

Determination of a minimum quality standard in terms of economics is not simple. First, I should like to suggest that the distribution of the costs of maintaining such a standard—with a view to providing incentives in the two directions discussed—appears no less important than a particular standard and the quantitative level of the abatement investment associ-

ated with it. Second, while I do not believe that economics has the tools to specify an optimum standard which would change over time and which would be different for different streams and different sections of the same stream, economic arguments can be advanced for a minimum standard that would be stable over time for all normal streams and sections of streams. By "normal," I mean streams and sections of streams that are not deliberately set aside for waste disposal. The economic aspects of such stream specialization will be considered presently.

An economic argument for the general adoption of minimum standards as policy objectives in the field of natural resources has been offered elsewhere.[13] This argument is based on the need to make allowance for uncertainty, on the desirability of avoiding irreversibilities, and on the relatively small costs of minimum standards.

For the present purpose, additional arguments may be offered for a particular minimum standard of water quality. This standard is one that would maintain a healthy habitat for fish life. Such a standard can be defined with respect to the well-known quantitative dimensions of quality within a narrow range. Dissolved oxygen content, for example, is not to drop below 5 ppm.[14] In addition, fish life is a sensitive indicator for a wide spectrum of quality dimensions, the standards for which are not yet fully established. For example, the *cumulative* effect of certain pollutants on aquatic life is still uncertain.

From the viewpoint of the economist, the minimum standard suggested here does not avoid all arbitrary elements, but it defines a point of the external cost function of pollution that is of great economic interest. External cost functions of pollution are conspicuously discontinuous. In other words, over a certain range of pollution, external costs are small. At a critical level of pollution, however, external costs become large.

The critical point of discontinuity in pollution damage to fish is economically relevant not merely for commercial and sport fishing. Recreational uses, such as swimming, boating, water skiing, hiking along the shores, and mere aesthetic enjoyment, suffer critically if this minimum standard is not maintained. Likewise, agricultural uses and some natural and artificial processes of purification are seriously affected. Furthermore, this minimum standard has economic relevance for other uses. Although it is too low for domestic, municipal, and some industrial uses, costs of special treatment for these uses are decreased because the supplying water resources are free of toxic and other substances that are no less harmful to fish than to humans. On the other hand, it would be very

[13] Ciriacy-Wantrup, *Resource Conservation*, . . ., Ch. 18, and "Conservation and Resource Programming," *Land Econ.*, Vol. 37, No. 2, May 1961.

[14] Most experts regard 4 ppm as the minimum (sublethal) figure for aquatic life and feel that at least 5 ppm is needed for normal reproduction.

costly to impose quality standards applicable to domestic water on water resources generally.

The "fishy" standard suggested here avoids the most difficult aspects of benefit-cost analysis, namely, the evaluation, in quantitative, pecuniary terms, of extramarket and collective benefits of pollution abatement. Economic calculation, however, is not pushed to the sidelines. The problem of realizing the standard with minimum total social costs remains, but it has become more manageable. General adoption of the minimum standard does not mean that a higher standard may not be economical for particular streams or sections of streams. The additional costs of a higher standard can be compared with the resulting additional benefits in each case. Here, also, the economic problem has become more manageable.

The last point brings me to the special case that was previously alluded to, namely, the zoning of a stream or a section thereof as open sewer without quality standard. For technological reasons, an open sewer has certain advantages over a closed one. The economics of such stream specialization are best discussed with reference to an actual example which I studied 2 years ago.

Water quality management in the Ruhr basin, referred to above (Section 2), is based on the concept of stream specialization. Water quality of the Ruhr is maintained at the minimum standard just discussed. A large portion of the wastes of the Ruhr basin, one of the largest industrial centers of the world, is transferred to the neighboring, parallel basin of the Emscher. The Emscher is intensively managed as a large, open sewer with up-to-date treatment plants at strategic points, making full use of the economies of scale. The Emscher basin, like that of the Ruhr, is under unified management. The two managements are so closely linked that functionally, although not legally, they can be regarded as one organization.

The results are impressive. The Ruhr and its man-made lakes form an attractive body of water that serves not only as the main water supply for the many municipalities and industrial complexes that make up the Ruhr district but also serves effectively the recreational needs of a large industrial population. All water sports are possible. The shores are intensively developed for recreation and residential purposes.

Stream specialization is sometimes recommended for this country. Some aspects of our example should be noted before it is imitated. Because of the small distances involved, the water supply and the recreational opportunities of the Ruhr basin are fully accessible to the Emscher basin—which has lost these assets. Further, a sewer system must discharge somewhere. The Emscher discharges into the Rhine, the large flow of which was for many years sufficient for dilution. In recent years, however, de-

mands on the Rhine for waste disposal have become so great that dilution is no longer sufficient. The problem is international in scope because the Rhine flows from Germany into Holland below the point of discharge of the Emscher. At this point a very large treatment plant is now under construction to bring the discharge from the sewer stream up to the quality of the receiving stream. Thus, before the concept of stream specialization is applied elsewhere, one should consider whether substitutes are available for those water uses which are irreversibly eliminated from the sewer stream and whether the discharge from the sewer stream will not create diseconomies that offset the economies made possible through stream specialization.

Time is running short, and I have not given a quantitative estimate of what the minimum standard suggested here would cost. I confess that there is no figure which I would regard as valid. The main reason is the uncertainty about the effects on this figure of changes in productive processes affecting the origin and disposal of wastes. Water policy itself will increase this uncertainty if it provides appropriate incentives along the lines suggested.

Fortunately, however, there are economists who are less skeptical than I am about long-range quantitative projections in water policy. Professor Wollman and his collaborators, for example, have undertaken such a study for the Select Committee on National Water Resources of the United States Senate.[15] They estimate that an additional abatement investment of $99.6 billion will be needed in this country between their base year (1954) and the year 2000 to maintain a quality standard of 4 ppm of dissolved oxygen in all streams. In this estimate, the interdependence of quality and quantity management is taken into account. Annual costs for minimum total cost combinations of abatement measures will be $2.4 billion by 1980 and $4.4 billion by 2000.

These are impressive figures. Time does not permit reviewing the methodology employed. The figures may be helpful through dramatizing the magnitude of the economic problem and thereby making the people and their representatives more willing to accept public policies in water quality management. The professional economist, however, will be aware that the effectiveness of the abatement investment is not dependent entirely on its size. This paper tried to show that the key economic problem for this effectiveness is the provision of appropriate incentives—among others through distributing the cost of an abatement investment of whatever size. The institutional systems through which this distribution can be achieved are a subject for another paper.

[15] U.S. Congress, Senate, Select Committee on National Water Resources, *Water Resources Activities in the U.S.*, 86th Cong., 2d Sess., 1960, Comm. Print No. 32, 131p.

DISCUSSION: WATER QUALITY, A PROBLEM FOR THE ECONOMIST

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Problems of water quality have been recognized by small segments of our economy in the United States and in some other parts of the world for many years. Mark Twain writing in 1875 referred to the Mississippi River as the "Great Sewer." The problem of water quality is becoming more acute in many areas of our country because of the rapidly increasing per capita use of water and our increasing population. The U. S. average municipal and industrial use per capita has increased from about 60 gallons in 1930 to about 160 gallons per day in 1960. Also more attention on rigid requirements is being placed on quality for municipal, industrial, recreational and even agricultural uses. These demands are expected to increase more than proportional to our increasing population. These demands are posing many important problems for the economist.

Dr. Wantrup divided his paper into three sections: (1) Quality Management, (2) Incidence of Social Costs and Benefits and (3) Formation of Policy Objectives. In each he has presented a careful analysis of the problem.

In this discussion I should like to comment on two points in his paper and briefly touch on four items not covered.

First, that "Quality Management has to deal with a multitude of use problems of a particular sort, namely with the sequence of different uses over time." This poses one of the most complex problems facing our Nation. We do not have adequate records on present uses, the degree to which these uses pollute the water, or the rotation of water uses. For example, it is estimated that the Mississippi River water is used 16 times between St. Louis and New Orleans—and it has been used several times before arriving in St. Louis.

The projection of control costs and benefits will be only rough estimates until these records are secured. Also, the problem of who shall pay for pollution control and at what point it is most economical to apply controls are dependent on such records. Economists should press for these records.

Second, the prediction "that water quality management will become a stronger force toward unifying river basin developments than water quantity management has proven up to now," seems to be sound. Pollution of both ground water and stream flow by the better known types of waste presents a real challenge. However, the new problems created by the addition of detergents and insecticides have not been fully recognized and

reported and may be a more serious challenge, if continued. These present special technical and economic problems for a wide variety of affected people.

The four additional items I should like to refer to are: First—nuclear wastes and fall-out. The increased manufacture of nuclear materials for industry and defense are important possible sources of pollution. The Public Health Service is carefully checking these sources. However, a Colorado professor recently reported that "there is no safe lower limit for radiation." The smallest amount can cause abnormalities in the human cell. Limited nuclear pollution could, in certain areas, make the economic considerations of many other pollutants seem rather insignificant.

Second—sea water and saline ground water is available in abundance. The work of the Office of Saline Water, Department of Interior and research by many other organizations promises to develop these into important and economical sources of water, at least for certain purposes. How these waters can be used, as a single source or combined with present water supplies, will offer some important problems to the technicians as well as the economists.

Third—The public understanding of the political and economic problems of, and consequences of, pollution cannot be neglected by economists. Research must be done, and then these results must be interpreted and presented to the public. Some economists should serve as leaders in public policy through their writings and by entering freely into discussion of the economics of water problems and particularly the problems of water quality. A speaker at the Western Resources Conference, held here last week, took particular note of this point in the following quote. "The public must be made increasingly aware of the acute and growing water crisis facing the Nation and the necessity for bold and far reaching conservation and anti-pollution programs."

"Scientists and professors concerned with water and land resources must translate their ideas in terms which are understandable by the average citizen—in other words, get off Cloud 9 and come down to earth."

Finally, as water supplies become more limited, additional attention through physical research and economic analysis must be given to water quality for irrigation. Certain lands are becoming more alkaline each year in spite of the fact that ⅛ to ½ or more of the irrigation water added to certain lands serves only to flush out soluable salts. The economics of this practice and the value of the return flow water will become more important in the near future.

WATER LAW AND ECONOMIC TRANSFERS OF WATER

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A FEW weeks ago I received from Dr. Mason Gaffney of the University of Missouri his paper entitled "Diseconomies Inherent in Western Water Laws" given at the Western Agricultural Economics Research Council at Tucson on January 23, 1961. Perhaps many of you who are present today are familiar with this, and have heard Dr. Gaffney's paper.

To me it was very disturbing. It is an account of an empirical study, apparently showing that theories that have been cherished by me and by some others do not actually work out in practice. Dr. Gaffney lists S. V. Ciriacy-Wantrup, Stephen Smith, and S. T. Harding as persons who hold the views that ordinary economic forces operate in the water field, and that they can be entrusted to approach the maximization of benefits from the use of the resource. To this group of economists and engineers may be added at least one lawyer, myself. I have long argued that transferable appropriative rights can operate in this fashion and I have long been a critic of those State laws which forbid the free transferability of appropriated water rights.[1]

But Dr. Gaffney tells us that this is not so, that in practice the law of water rights is the initial cause in creating unfortunate economic practices and the binding force that perpetuates them and prevents economics from taking over and correcting the situation.[2] Dr. Gaffney studied the practices in the lower Kaweah basin of California. He shows that there are definite "diseconomies" in the system. By various means he establishes that water has not only quite different but quite widely differing marginal productivities, primarily between a low delta area where water is used for alfalfa, barley and pasture, and benchlands at a higher altitude where citrus fruits and other orchard produce can be grown. But water rights on the lowland delta area are the earlier and better rights, and the benchlands (until recently rescued by the Central Valley Project) were short of water. Contrary to the theory stated above, the water did not move from the low value crops to the high value. Some attempts were

[1] See *Missouri: Land and Water (Report of the Missouri Basin Survey Commission)* p. 195 (1953); Trelease, Frank J., *A Model State Water Code for River Basin Development, 22 Law and Contemporary Problems,* pp. 301, 314-315 (1957); Trelease, Frank J., *Severance of Water Rights from Wyoming Lands* (Report No. 2, Wyo. Legislative Res. Committee, 1960).

[2] Only the latter charge, that laws block economic transfers, is dealt with in this discussion.

made to bring such transfers about. A few have been successful, others have been blocked.

The blame for all of this is laid at the doorstep of water law. Appropriative water law was given the principal blame for the initial poor pattern of water allocation, since the early rights are not on the best soils, because good soils have the better dry farming potentials and less need for irrigation, and the early rights are on the hay and grain lands which can be quickly developed with low investments rather than on the citrus groves with high initial costs and a long developmental period. The same law of prior appropriation is given the blame for freezing this poor pattern of use.[3] Dr. Gaffney states that although it is alleged that appropriative rights are transferable, there is no evidence that any significant volume of water resources are effectively transferable in response to ordinary conomic pressures. He does notice that some sales of shares in water companies took place. The citrus orchards are primarily in the Lindsay-Strathmore Irrigation District, which has bought shares from water companies, then attempted to have the water represented by the shares transferred upstream to their ditch which could reach the higher benchlands. This attempt was blocked by an injunction. To avoid a similar result from purchases of shares from another water company, the water is received through that water company's headgate, then actually pumped back uphill to the orange groves on the benchland.

In addition to the use of water for poor crops on poor land, he points out that the variability of the water supply has been increased by variability in demands for irrigation water. He also notes excess diversion capacity, excess canal mileage, scattered service areas, overlapping service areas, unintegrated ditches and cross hauling, conveyance losses, inadequate uses of ground water and re-use of water and the segregation of the stream system from other local streams and other nearby large rivers. I wonder how much of these diseconomies should be laid to the door of water law, and how much to the inefficiencies of the American people bumbling along in the fashion that has ultimately resulted in making this nation great. I may be wrong, but it seems to me I see "diseconomies" all about me. In ordinary farm land, where irrigation is not used, I wonder whether an economist could not establish that the land was being used for crops that would not return maximum gains, that poor land was being used for crops and good land was being used for non-crop purposes. It seems to me that I see similar things about me in cities. Why, among all of the historical accidents and "irrational" decisions that

[3] Gaffney also points out that California's law of riparian rights and of correlative ground water rights are unsuitable for economic transfers. With this I thoroughly agree. See *A Model State Water Code,* supra n. 1.

have produced the situation on the Kaweah, should water law be singled out as the sole cause? But I will not duck the issue in this fashion.

The California law is quite clear that water rights are transferable. Rights acquired since the 1913 Water Code may be changed in point of diversion, place of us, purpose of use from that specified in the original application permit or license, with the permission of the State Water Rights Board. Before permission to make such a change is granted, the holder of the water right shall establish to the satisfaction of the Board that the change will not operate to the injury of any legal user of the water involved. Provision is given for notice to other water users, and for hearings. Water rights initiated prior to the 1913 Water Code are governed by an older law, which provides that the person entitled to the use of water may change the point of diversion, place of use or purpose of use if others are not injured by such change, and may extend the ditch, flume, pipe or aqueduct by which the diversion is made to places beyond that where the first use was made.[4]

Now the question is, if this is the law, why is this law somehow unuseable? How can law which specifically states that changes can be made operate to block changes?

Dr. Gaffney seems to assume that the owners of the orange groves and the other fruit growers have been and are willing to buy the water or water rights of the owners of the delta lands, who were themselves willing to sell, but that the law, for some perverse reason, will not permit this transaction to take place.[5] Now it is true that one such transfer was blocked by a lawsuit which enjoined one attempted change in point of diversion. The Lindsay-Strathmore Irrigation District bought shares in the mutual water companies that serve the delta area. These shares were bought from former water users in that area, willing to sell to the orange growers. The irrigation district proceeded, on their own motion and under claim of right, to take the amount of water represented by these shares out of the streams at a higher point of diversion. The district was sued by the companies involved, which alleged that the attempt to segregate and take into other ditches the water owned by their shareholders would "disrupt and interminably confuse the system of administration of water rights on the Kaweah River and make it impossible to administer the distribution of water from the river and from its branches to the respective persons and corporations who were entitled to the water." A temporary injunction was issued on the strength of these allegations.[6] At

[4] Cal. Water Code (Deering 1942) Secs. 1701-1706.

[5] In some States (e.g., Wyoming, Arizona) this could be true. See Severance of Water Rights, supra n. 1.

[6] Consolidated Peoples Ditch Co. v. Foothill Ditch Co., 205 Cal. 54, 269 Pac. 915 (1928).

some later time the irrigation district had an opportunity to show that these allegations were not true, but since the injunction was continued in force it must be assumed that something like this was actually true, that some disadvantage occurred from forcing the company to serve an entirely different area. One is forced to speculate as to who made the objections in the case—why was the management of the companies, or the other water user customers of the companies, so opposed to the transfer? What was the damage that would have resulted from the change in the point of diversion?[7]

We must ask these questions because "the law" is not an impersonal thing. It is seldom if ever self-operating. Let's go back to a fundamental definition, and accept for the moment Mr. Justice Holmes' idea that the law is a prediction: If you spit on the sidewalk you will pay a fine; if you try to erect a factory in a residential zone your neighbors will get an injunction. So here: if the Lindsay-Strathmore Irrigation District attempts to change the place of use or point of diversion of water so that injury will occur to other water users, they can block the transfer. Only in rather rare situations has the Government set up policing agencies that enforce the law; for the most part it is your neighbors, not the cops, who must take you to court.

Referring back to the major principle, that a change in the place of use of water is permissible if no injury is done to other water users, one of the most common types of injury is the loss of the benefit of return flows from the diversion. If a diversion of water results in a return flow to the stream that is useable by other appropriators, the movement of the entire diversion out of the valley and up on the bench will result in a lessening of the supply available to others. The rule seems to have been quite well developed that in such cases the only thing that the water user "owns" and can sell or transfer to another place of use is the amount of water which he consumptively uses.[8] This means, of course, that a purchaser of water may have to pay the seller for not using more water than the buyer can get. Assuming that return flows were quite high, say one-

[7] Where no damage occurs, it is clear that a Calif. water company can split its appropriation and change the point of diversion of part of it. Peoples Ditch Co. v. Foothills Irrigation District (Cal. App. 1931) 297 Pac. 71. In other States changes of corporation-managed water have been made by purchase of shares and change of the waters to other ditches. It is true that these changes have caused problems. In Idaho such a person must get consent of the company or district to the change. Idaho Stats. Sec. 42-222. And in Colorado a city that bought shares in an irrigation company and changed the water to a municipal use was forced to continue to pay all assessments on the shares. Brighton Ditch Co. v. Englewood, 124 Colo. 366, 237 P. 2d 116 (1951).

[8] See Severance of Water Rights, supra n. 1. There are other difficulties in changing water rights from place to place, that keep such rights from being completely fungible like a share of stock or a bushel of wheat, but these are inherent in the physical nature of water and water use, and not in the law.

half of diversions, such a purchaser would have to buy out the users of two acre-feet in order to obtain one acre-foot of water for himself. I am tempted to wonder whether, in the attempted changes from the delta lands to the benchlands that were blocked by the court, the Lindsay-Strathmore people actually attempted to take only that which was theirs. I wonder whether the cross-hauling of water which Dr. Gaffney describes and deplores was necessary in order to avoid a change of the point of diversion which would deprive the downstream appropriators of such benefits from return flows. In other words, I wonder if the right payments were made or offered to the right people to effect a legal transfer. I wonder whether the economics of such a legal transfer, assuming all of such payments, did not in fact block the transfer. I wonder if the Lindsay-Strathmore District had competent legal advice when it acted on its own motion without consulting or obtaining the permission of the companies whose water they were taking. I wonder whether perhaps both the people buying and the people selling had no clear concept of what the property was, what could be sold, what could be transferred and what belonged to other people.

I think that as economists you will in general agree that the spill-over effects or externalities of a transaction are a part of the costs of that transaction, and that ordinarily the function of law is to see that the burden of the costs is allocated to the persons who get the benefits.[9] In other words, what I have been saying is I think that the Lindsay-Strathmore purchase transaction might have been blocked because other persons would have been seriously affected and damaged and Lindsay-Strathmore was unwilling (or unable economically) to assume the full burden.

As a lawyer, law teacher, head of a law school I believe that the law is a useful thing, that quite generally it operates for the benefit of mankind. I find it hard to believe that somehow, despite its language, there is a peevishness, a perverseness, in the law that operates in some malicious fashion to keep this good irrigation district from accomplishing its desire and keeps these poor delta pasture growers from enriching themselves with the money from the orange growers.

One factor mentioned by Dr. Gaffney is that the owners of water rights put them in a class with family heirlooms and heap social disapproval on any of their number who would sell this treasure. He states, "By its nature the relative strength of this factor is impossible to quantify, but in my observation and judgment it is appreciable." I too can testify as to the strength of this feeling. Wyoming has had for many years the

[9] Chryst, W. E., *Legal Econ. Res.* Monograph No. 1, Iowa Agr. Law Center (1959) p. 15.

"no change rule" and when I prepared for a legislative study committee a paper showing hoped-for economies and improvements in water use a very considerable furor resulted. It even went so far, I understand, that I was called by some legislators "radical", although the most radical thing I advocated was laissez-faire economics and my most subversive suggestion was that Wyoming's law might be made the same as that of every state which surrounds it. But seriously, quite a few irrigators resented the fact that I would make water rights transferable. They have a feeling in Wyoming that their water rights are better than those elsewhere, because theirs are attached to the land. Though transferability may appear a valuable and desirable attribute to you and to me, it does not to them. They resist an attempt to change the law.

This reluctance to sell water rights is not a legal factor.[10] We do not here have a law that blocks people from doing what they want to do for economic reasons, but rather people who do not accept a legal and economic opportunity offered to them. Dr. Gaffney says of the law: "Yet Justice is not entirely blind. It is more to be likened to the nearsighted Mr. Magoo who does respond, however inappropriately, to the major outlines of things." And people react to economics in somewhat the same fashion. People are not economists, or perhaps, to get back at Dr. Gaffney for that crack, I should say that economists are apparently not people. Here is a factor, neither legal nor economic, that blocks a "rational" decision—i.e., a market-oriented economic decision.

The law's motivation is the same as the economist's—the maximization principle.[11] The working principle behind law is that it acts not as a barrier but as a mechanism for getting things done.[12] The law belongs to the people; it represents the value judgments of the majority as to desirable courses of conduct that may be taken. If the law is a barrier to a resource use, it is because the community feels that the use is not a desirable one. If and when the people are convinced—perhaps by economists such as Dr. Gaffney—that things blocked by law are in fact desirable, they can and will change the law.

[10] Gaffney relates it indirectly to law but the connection is remote and the reasoning subliminal.

[11] Pound, Roscoe, *My Philosophy of Law*, 251 (1941).

[12] Hurst, J. W., *Law and the Conditions of Freedom* (1956).

Note: John R. Greenman, discussant for Frank J. Trelease's paper was out of the country at the time of publication, and his paper, therefore, was not available.

WEATHER AND CROP YIELDS

CHAIRMAN: KENNETH L. BACHMAN, ECONOMIC RESEARCH SERVICE, USDA

A MEASURE OF THE INFLUENCE OF WEATHER ON CROP PRODUCTION[1]

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BEFORE talking about measuring "weather," let me first comment on what I mean by the term. Many people think of many things when they speak of weather. I mean here a collection of various conditions of the atmosphere including such phenomena as rainfall, snowfall, hail, humidity, amount of sunshine, light intensity, atmospheric pressure, and temperature. I also refer to weather as the conditions of the atmosphere occurring during a definite time period as contrasted with the term "climate," which I take to mean the long-run characteristics of weather at a particular place. In this paper I shall discuss a way of measuring the influence on crop production of this phenomenon called "weather."

The Need for a Measure

Why do we need a measure of the influence of weather? I have observed three main types of uses for such a measure.

One use has been in supply analysis for individual and groups of commodities. An important need in supply analysis is for a variable to account for the variation in yield or output due to weather. Two examples of such a use for specific crops at limited locations are found in Johnson's analysis of the impact of Government programs on the burley tobacco industry[2] and Hathaway's analysis of the impact of Government programs on the dry bean industry in Michigan.[3] In these studies, a weather variable was introduced in their supply equations computed from variations in yields of experimental plot data.

More recently, Cromarty used weather indexes which I had computed[4] in recomputing parameters of certain supply relationships in his

[1] I have benefited from the comments of several persons in writing this paper. Although I cannot mention them all, I want to mention William Cromarty of Connell & Co. and Glen Barton, Don Durost, and Larry Shaw of the Farm Econ. Div., Econ. Res. Serv., USDA, in particular. Any inadequacies in this article, however, are strictly my own.

[2] Johnson, G. L., *Burley Tobacco Control Programs. Their Over-All Effect on Production and Prices, 1933-50,* Ky. Agr. Exp. Sta., Bull. 580, 1952.

[3] Hathaway, D. E. *The Effects of the Price Support Program on the Dry Bean Industry in Michigan,* Mich. Agr. Exp. Sta. Bul. 250, 1955.

[4] Stallings, J. L., *Indexes of the Influence of Weather on Agricultural Output,* Mich. State Univ., 1958. (Ph.D. Thesis Unpublished); "Weather Indexes," *Journal Farm Economics,* Vol. 42, 1960, pp. 180-186; "Weather Indexes," *Western Farm Econ. Assn. Proceedings,* 1959.

work on the structure of the United States agricultural economy.[5] Before these indexes were available, he had used such measures as precipitation at critical times in the growth of plants and abandoned acres for certain crops to account for weather. Griliches used these indexes as variables in his Estimates of the Aggregate U. S. Farm Supply Function.[6] W. W. Addison of the Farm Economics Division, Economic Research Service, has also used them as variables in some aggregate production functions.[7]

In another type of use, researchers have wanted a measure of weather to "take out" the effects of weather on yields and production before further study of other variables. Nauheim, Bailey, and Merrick used two components of weather, precipitation and temperature, to adjust wheat yields for weather before further analysis.[8] Clawson was interested in adjusting gross farm output for variations due to weather so that trends due to technology would be more identifiable.[9] Glen Barton of the Farm Economics Division, Economic Research Service, USDA, has also expressed a need for a so-called "weather deflator" to adjust yields and production for weather so that trends would be more identifiable.

There is also need for a measure of the influence of weather for individual years for an informal explanation of *ex post* production phenomena. Many statements have been made in the past about the effect of weather in this or that year or groups of years with much less than ideal empirical evidence with which to back the statements. A measure of the influence of weather would have been helpful in such cases as more refined evidence than yearly precipitation or simply low yields. Hathaway used the indexes I computed in this way in his article "Agriculture in an Unstable Economy Revisited."[10]

No doubt there are other needs and uses for a measure of the influence of weather that are not yet recognized, but those mentioned should suffice as examples of past needs and should give an indication of possible future needs.

Approaches That Have Been Used

In the past, when researchers needed a measure of the influence of weather for use in economic analysis, several approaches were used. All

[5] Cromarty, W. A. *Economic Structure in American Agriculture.* Mich. State Univ., 1957 (Ph.D. Thesis, Unpublished).

[6] Griliches, Zvi, "Estimates of the Aggregate U.S. Farm Supply Function," *J. Farm Econ.*, Vol. 42: 282-293.

[7] Unpublished preliminary work.

[8] Nauheim, C. W., Bailey, W. R. and Merrick, D. E., *Wheat Production. Trends-Problems-Programs-Opportunities for Adjustment.* USDA AIB 179, 1958.

[9] Clawson, Marion, "Reflections on Gross Farm Output," *J. Farm Econ.*, Vol. 41: 247-256.

[10] Hathaway, D. E., "Agriculture in an Unstable Economy Revisited," *J. Farm Econ.*, Vol. 41: 487-499.

of them may be adequate in specific cases. Among them were total yearly precipitation, precipitation at critical times in the growth of a plant, precipitation and temperature, precipitation and various other combinations of weather and nonweather factors, abandoned acres, and indexes computed from experimental plot data. A measure generated from a function of various direct and indirect components of the weather and nonweather factors associated with weather has been considered also.

Some of the advantages and disadvantages of these approaches are easily seen. Although precipitation might be the single most important weather factor affecting yield in many cases, use of total yearly precipitation or even precipitation at critical times in the growth of plants would not adequately explain the total influence of weather in all cases. Although use of precipitation at critical times may be an improvement over total yearly precipitation, the amount occurring at one time is also very important.

In unpublished work at Nebraska, R. D. Johnson[11] has developed a technique for modifying precipitation for certain minimum and maximum amounts so that the correlation between modified precipitation and yields, compared with uncorrected precipitation, is substantially improved. Other factors also may have tremendous effects under certain conditions. The same amount of precipitation, for instance, may have quite a different effect if accompanied by high temperatures, low humidity, and low soil moisture than if accompanied by lower temperatures, high humidity, and high soil moistures. Also, the relationships and interrelationships are complicated.

It can be seen that abandoned acres have limitations as abandonment may not be associated entirely with weather. The experimental plot data approach may be theoretically desirable but adequate data may not be available, as we shall see later. A measure generated from a function containing several direct and indirect weather factors appeals greatly to some persons in that it could be used in *ex post* economic analysis and tie in as well with work concerned with forecasting yields from weather factors. I think this approach might also have greater appeal to many "scientifically oriented" persons, in that it seems to be more of an explanation of the individual "causes" of yield variation rather than a measure of total *ex post* effects as in the plot-data approach. The main objection I have found to such an approach, both in my own work and in comments from others, has been its very complicated nature.

The "Ideal" Measure

What would a theoretically "ideal" measure of the influence of weather

[11] R. D. Johnson was with the Nebr. Agr. Exp. Sta. when this work was done. He is now with the Econ. Res. Serv., USDA, stationed at the Univ. of Neb., Lincoln, Neb.

on crop yields be like if such a measure were available? First, let us look at the sources of yield variation.

Variations in crop yields from year to year result chiefly from two types of factors—those we consider controllable and those we consider not controllable. Normally, we think of controllable factors as such things as amounts and types of seed, tillage practices, and amounts and methods of application of fertilizer. We may consider factors beyond our control in particular years as consisting chiefly of weather factors, although there may be other factors in this category. For instance, such nonweather factors as insects, disease, errors of management, accidents, and other factors may not be considered controllable in a particular year and may also affect yield.

Variations due to weather factors may be further classified as "direct" and "indirect" influences. Although the relationships and interrelationships may be complicated, I think it should be clear that the various components of weather have certain direct effects on yields. But, there are indirect influences of weather as well as complicated interrelationships between various weather and nonweather factors. The intensity of certain insect infestations and plant diseases, for instance, is affected by weather. These effects may not be wholly the direct results of weather in a particular year. They may be affected by weather factors in previous years. The effect of weather on yields of plants may also vary with the level of fertilizer, soil type, cultural practices, and many other factors.

Which of these influences would we wish to have included in an ideal measure of the influence of weather? Unfortunately, I have not been able to find complete agreement among persons with whom I have talked. While some wish a measure that would account for all of the influence of weather, whether direct or indirect, others want to know the influence of particular variables such as precipitation at particular times, precipitation and temperature, precipitation plus temperature and soil moisture, and other combinations of variables. Some do not want included certain indirect influences such as insect damage and disease associated with weather.

It seems that the characteristics of an ideal measure of the influence of weather depend largely upon the proposed use of the measure. If interest lies in forecasting yields from components of weather, as well as having an *ex post* measure of the influence of weather, there appears to be no substitute for studying the relationships and interrelationships between the various components of weather, nonweather factors, and yields. But, if one is interested only in an *ex post* measure of the influence of weather, or if such a measure is sufficient, its method of construction can be quite different. Normally, in the latter case, we are interested only in

accounting for as much of the variation in the dependent variable as possible and not necessarily in forecasting crop yields. Both the direct and indirect influences of weather would normally be wanted, although there may still be disagreement as to whether certain indirect influences, such as the influence of insects and disease, should be measured separately, especially if they are studied variables.

As forecasting is a separate problem in itself and as Morgan's paper[12] covers this topic I will limit my paper to discussion of a suggested way of constructing an *ex post* measure of the influence of weather. Also, I will consider a measure of all the influences of weather, direct or indirect.

The Experimental Plot Data Approach

The indexes I computed from experimental plot data and reported in this journal[13] represented a first attempt on my part at construction of indexes of the influence of weather on crop yields and production. Although I have no more actual data at this time, I would like to give more detail on the experimental plot data approach with some suggested modifications I had not mentioned in previous writing. I would like to present this method in enough detail so that it can be used by researchers for crops other than those covered in my analysis and for construction of indexes for more limited geographic areas. It may also aid prospective users of my indexes in bringing them up-to-date, as most of them are computed only to the middle 50's.

Briefly, it is assumed that if time series of yields for particular crops can be obtained from experimental plots in the areas where these crops are grown and where as many variables as possible have been held constant, the remaining variations in yields, after any trends have been removed, are due mainly to weather. Any other variation not accounted for is assumed to be randomly and normally distributed with an expected value of zero. An index is then computed as the ratio of actual yields to a fitted trend. In this approach, it is not necessary to know the relationships and interrelationships between different direct and indirect weather and nonweather factors because the effects of weather are measured in net, *ex post*, and presumably independent of economic and other factors. Thus, this approach measures all influences of weather whether direct or indirect. Let us look at this approach in more detail.

Desirable data and reality

We can speculate on the type of data we would like to have for this approach if such were available. First, we would like the experimental

[12] To be given following my paper. (See page 1172.)

[13] Stallings, J. L., "Weather Indexes," *J. Farm Econ.*, Vol. 42, 1960; pp. 180-186.

plot data to reflect the varieties, practices, management and technology level, and other nonweather and weather conditions representative of production in the area represented by the particular index. We would like experimental plot data with everything held constant, except for weather, over a length of time at least as long as that for which we wish to construct indexes. We would also like to have the time period long enough so that long-run variations in yields due to weather, or "bunchiness" in data due to weather, are not obscured. We would like nonweather trends, if they exist, to be easily separable from long-term weather variations and "bunchiness," if they exist, and for them to be accurately characterized by some easily fitted function or trend line. We would like to have data from enough locations so that the overall effect of weather in the area or region is adequately represented.

Now let's look at reality. It would be rare indeed to find "ideal" data even for a particular location and for a particular crop. More often, we may have to be content with time series that represent conditions differing from those typical or representative of a large amount of production. We may find that the only series of any length we can find are from a check plot or a no-treatment situation which may not be representative. We may have to choose between a highly representative series that is too short and a less representative series that is long enough. We may find an experiment that has been running for a long time, but which may not have been on the same location over the whole time period. Although we would like to be as objective as possible, we find that much judgment must be used and that construction of an index may require considerable skill.

If our ideal conditions have been met, we may presume that trends in data can be due only to increases and decreases in fertility of the soil due to the treatment. In reality, however, we may find that observed trends may also be partially, if not entirely, due to improved technology and management on the experimental plots. Or, we may find long-term variations or "bunchiness" of yields due to weather which have not been smoothed. We must somehow satisfy ourselves that we have not obscured these long-run weather variations and then proceed to try to deal with the nonweather trends, whether they are from increases and decreases in fertility or from other factors such as technology and management.

Fitting trends

There are several approaches that might be used in fitting a trend to time series of crop yields. I simply fitted a linear trend to the data and computed indexes as the ratio of the actual to the computed trend yields. However, it seems logical that these trends may not be linear, especially

if they resulted from increases or decreases in fertility of the soil which may tend to follow the law of diminishing returns. In this case, use of a linear trend might result in ascribing some of the influence of technology or other factors to weather. Other approaches that could be used would be to fit some nonlinear mathematical function, use a moving average with extrapolation on either end, or simply to fit a line by eye. I used a linear trend because it was simple and because I felt that, in my case, other methods would not offer enough improvement to justify the extra trouble. Also, if long-run variations in yields or bunchiness of data due to weather exist, the nonlinear functions and moving averages might result in obscuring some of these weather effects. If it is felt that this is no problem, however, an easy and satisfactory method of "removing" trend would be to fit a long-run moving average of possibly 9 or 11 years with extrapolations on the ends and compute indexes as ratios of actual yields to this.

Splicing shorter series

Many times series as long as the desired length of time are not available and shorter series must be used. This involves splicing these series together. Theoretically, if the proper trend has been fitted and the variations in yields truly represent variations due to weather there should be no problem. If series overlap, indexes for the shorter series can simply be computed and averaged for overlapping years. If they do not overlap, they can be continued as though no break occurred. In reality, however, some results may seem to be spurious because of such things as the choice of a trend line, or if the series is short, by chance. It may also be that there are shorter term trends due to weather or other factors that are distorting the indexes and that would be smoothed in a longer series. If only shorter series are available or have more desirable properties than a longer series, I see no substitute for using judgment and a bit of skill, in lieu of more detailed analysis, to work out such difficulties when they occur.

Weighting

In order to combine series for a particular crop at a particular location or to combine the indexes at several locations, some system of weighting must be used. A weighting system based on production rather than value is usually desired in this case. At particular locations, if more than a single time series has been used, it is usually sufficient simply to average the indexes for specific years to get one index at one location (equal weights for every year). If two or more series at one location represent significantly different production situations in the area, however, a sys-

tem of weighting based on percentage of production represented by each system for representative base periods may be used. For weighting series together for different areas into an index representing a combined area, such as the Great Plains or the whole United States, the same procedure may be used.

In theory an "ideal" weighting system would be one that employed given-year production weights, in which production would be adjusted for the influence of weather. As a practical matter, however, the use of representative base periods and possibly, splicing, is usually necessary. Choice of a base period may be a problem if production in different situations or in the different areas has changed over time. If it has not changed, one base period will be sufficient. If it has, two or more base periods may be necessary for different segments of the time series. The base periods should be long enough to average out effectively year-to-year variations in the relative importance of production between regions.

In computing an index of the influence of weather on aggregates, such as food grains or feed grains, however, a weighting system based on constant-dollar value of production is usually the more feasible approach (one cannot mix apples and pears). The same general approach recommended for weighting by production can be used in weighting by value.

Work in Progress

Although several projects dealing with different aspects of weather are under way, the only one I know of that is specifically concerned with computing a measure such as I have discussed is a pilot study by the Production Needs and Response Investigations, Farm Economics Division, Economic Research Service, USDA. This is a pilot study to explore the possibility of developing indexes of the influence of weather, on a limited scale at present, with the idea that work will be expanded if this proves fruitful.

DISCUSSION: A MEASURE OF THE INFLUENCE OF WEATHER ON CROP PRODUCTION

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Stallings is somewhat unique among economists in that he has done *more* than talk about the weather. It is a pleasure to discuss this paper for Stallings is not only an authority in his field, he has pioneered in the development of weather indexes. Furthermore, his paper is clear, concise, and well organized.

Clearly, Stallings' indexes are not measures of weather *per se*. Rather, they measure the *ex post* effect of weather and related variables on the level of yields and output. This is an important distinction, for the index must be evaluated in terms of its accuracy and efficiency in measuring the effect of weather and related variables. As the author points out, the index cannot be used as a predictor of yields.

The author chooses, partly I suspect as a consequence of a lack of alternatives, to lump together the direct and indirect effects of weather. This is done explicitly by assuming that factors other than fertility levels are constant over the experimental period. Observation would suggest, however, that experimenters attempt to optimize nonexperimental variables. Thus, it is likely that insect control and other production practices are generally altered over the experimental period to keep abreast of technological advances. Thus, one might suspect that this is reflected in the index by diminishing indirect effects of weather.

If one may assume that commercial farmers rapidly adopt improved insecticides and other technical advances, then the fact that Stallings may tend to underestimate indirect effects may be a positive attribute of the index. However, the statement "If our ideal conditions have been met we may presume that trends in data can be due only to increases and decreases in fertility of the soil due to the treatment" may be, as the author suggests, questionable in actual practice. I am suggesting that a part of technical development may be so removed as trends in computing the index.

Weather affects yields and farm output both through the pattern of production, or the crops planted, and through the yield received. One would suspect that the Stallings' index fails to adequately measure weather effects on the pattern of production. This may be a positive or negative attribute depending on the use to be made of the index.

Stallings cites three uses of measures of weather effects. These are: (1) analyses of agricultural supply, (2) analyses of yield and production trends corrected for weather, and (3) measurements of the importance of weather as an explanation of production in a given year. Since his paper is devoted to the use of such indexes for improved economic analysis, we might examine the use of weather indexes in supply analyses.

The following quotation is taken from a recent *Journal* article, "The weather index proves to be a very useful tool of analysis, accounting for a substantial fraction of the explained variance."[1] Other authors have made similar observations. Thus, the evidence clearly indicates that the inclusion of the Stallings' weather variable materially improves the may-

[1] Griliches, Zvi, "Estimates of the Average U. S. Supply Function," *J. Farm Econ.*, Vol. XLII, No. 2, May 1960, pp. 282-293.

nitude of the R^2 of such analyses. One would be surprised if the results were different. Certainly when one introduces an independent variable which is highly correlated with the error term, the percent explanation improves. Basically, the introduction of a weather index, which appears to be an index of the error term from other experiments, into such analyses consists simply of making a part of the previously unexplained deviation an independent, but vaguely defined non-structural variable. However, given the usual assumption of randomness, normality, etc., would one expect the introduction of such an index to change the structural parameters of the system? If not, we may then ask what has, in fact, been gained by introducing such a weather variable into supply analyses? Perhaps this is a question for statisticians or econometricians.

In conclusion, I suggest that Stallings should certainly be encouraged to continue his research with weather, for weather-agricultural relationships constitute a major uncertainty facing our agricultural industry.

IMPORTANCE OF WEATHER VARIABILITY ON MANAGEMENT DECISIONS

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THE IMPACT of weather variability on management decisions is not the same in all regions of the United States. Our discussion of this topic is limited to the Great Plains. Weather variability is generally considered to be a unique and more serious problem in the Great Plains than in other regions.

An effort is made to present the complexity of the impact of weather variability on row-crop agriculture in the Great Plains. The effect of a possible tendency for rainfall and yields to "bunch" is discussed. Also, a strategy to meet weather hazards in the region is suggested.

Influence of Climate on Crop Yields

Climatic factors have marked effects on yield and profit in the Texas High Plains even though irrigation is extensively practiced. Temperatures, the amount and distribution of rainfall and the moisture-temperature relationships are highly variable. In addition, the area has a rather high frequency of hail and sand storms which are damaging to cotton and other crops.

There is an interaction between the type of soil and rainfall on the yields of dryland cotton. Research in the Southern Plains shows that 100 pounds of cotton lint per acre could be produced on sandy soils with about half the rainfall required for similar yields on clay loam soils.[2] This study also shows 9 inches of preseasonal rainfall at Lubbock would give a probable yield of 190 pounds of lint per acre with 5 inches of seasonal rainfall and a probable yield of 290 pounds of lint with 13 inches of seasonal rainfall. However, where only 3 inches of preseasonal rainfall have been received, probable limits of production lie between 90 pounds of lint for 5 inches of seasonal rainfall and 190 pounds of lint for 13 inches of seasonal rainfall. This points up the extent to which yields within a given year are affected by the amount of preseasonal rainfall.

Temperature plays an important part in determining the extent of fruit development of both irrigated and dryland cotton. Temperature in the fall on the High Plains often drops below optimum levels for boll and fiber development. Cool weather beginning in the latter part of August can

[1] The authors wish to express their appreciation to P. E. Hildebrand, C. A. Moore, D. S. Moore, and R. E. Hatch for their helpful criticisms.

[2] Burnett, Earl and Moldenhauer, W. C., *Using Rainfall Records as Guides to Predict Yields of Cotton on Drylands of the High and Rolling Plains of Texas,* Tex. Agr. Expt. Sta. MP-223, Aug. 1957.

cause sharp declines in seed index, lint index, micronaire, staple, and other properties of High Plains cotton. Early fall freezes damage late maturing cotton and increase the percentage of immature fibers. On the other hand, it is often difficult to establish the cotton crop during the early season in the High Plains because of poor growing conditions. Emergence and seedling growth of cotton in the soil at 70°F. is poor and cotton does not germinate at 65°F. Disease, hail, and sand damage are more severe when the rate of growth is slow. Thus, cotton quality is not only influenced by the length of the growing season, but by low temperatures during the spring and fall.

The interactions of temperature conditions and management practices are often complex. The factors for optimum fiber development are not the same as those for optimum growth of cotton. For example, with low soil temperature, excessive water and nitrogen tend to enhance the adverse effect of low temperature on fiber development. The potential fiber development may be damaged by attempts to promote plant growth by irrigation or nitrogen application with a set of low temperature conditions, which often occur in the Plains.

Bunchiness or Runs of Years

Observers of Great Plains agriculture have suggested that the bunching of "bad" and "good" years into long periods, not yield variability itself, constitutes the core of the economic problem. Many references have been made to regularly recurring cycles of wet and dry periods in the Great Plains climate. A few research workers have attempted to use statistical measures for determining the tendency of "good" and "bad" years to bunch. Clawson found a strong tendency for bunchiness of annual precipitation in the Northern Plains, but less evidence and bunchiness in the Southern Plains.[3] The coefficient of variability sequence was used as the statistical measure. This test is calculated by dividing the average cumulative deviation by the average annual deviation.

Most tests for cyclical fluctuations require records for a rather long period of time and are based on an assumption that the errors are normally distributed. However, Wallis and Moore have devised a non-parametric test which has the advantage that it is valid for any frequency distribution.[4] It is based upon the length and number of runs to be expected in a random arrangement of a series. Recently, research workers in Texas, Oklahoma and Montana have used the test to determine the randomness of rainfall and yield series.[5] Although the methods of defining length of runs varied, there was a tendency for yields and rainfall

[3] Clawson, Marion, "Sequence in Variation of Annual Precipitation in the Western United States," *J. Land and Public Utility Econ.*, Vol. 23, No. 3, pp. 271-88.

to bunch in Oklahoma and Montana. However, in Texas only 3 of 30 stations were found to have non-random series of annual rainfall.

Results of the Wallis and Moore test appear to be greatly influenced by the definition of a run. Some research workers have defined the end of a run as a change of direction in the series. Others have considered a change of direction from a 4 year moving average as a turning point. Obviously, the latter method of defining turning point would cause the test to indicate bunchiness more readily than by defining turning point as a simple change of direction. Bostwick has suggested the use of the Markov chain process as a technique which indicates bunchiness tendencies and predicts the likelihood of, say, next year's yield based upon this year's yield.[6]

A need exists for the development of a valid statistical test for bunchiness. Both the Clawson test and the Wallis and Moore test contain certain logical difficulties, either in the test itself or in its application. The Markov chain process appears to have real possibilities but needs further study. If high and low incomes do tend to bunch, the real economic problems in optimal resource use are vastly different than if their occurrence is random.

Goals of Plains Farmers

Economists have suggested Plains farmers organize and operate farms differently than farmers in regions of more random income variability or less bunchiness of low and high annual income. Observers of Great Plains agriculture have agreed that farmers in the area do not attempt to operate their farms to attain stability of income.[7] However, financial survival of the firm in the short run has been often considered by research workers as a necessary goal due to weather hazards.

Although short-run financial survival must be an inherent goal of all Plains farm families, it is our contention that achievement of this goal is not a major problem. A recent study reveals that 89 to 95 percent of Great Plains farmers who desired credit were successful in obtaining it.[8]

[4] Wallis, W. A. and Moore, G. H., "A Significance Test for Time Series Analysis," *J. Amer. Stat. Assn.*, Vol. 36, pp. 401-409.

[5] Hildreth, R. J. and Thomas, G. W., *Farming and Ranching Risk as Influenced by Rainfall*, Tex. Agr. Expt. Sta. MP-154, Jan. 1956; Friedman, Don G., *The Production of Long-continuing Drought in South and Southwest Texas, The Traveler's Weather Research Center*, No. 1, Sept. 1956; Greve, R. W., Plaxico, J. S. and Lagrone, W. F., *Production and Income Variability of Alternative Farm Enterprises in Northwest Oklahoma*, Okla. Agr. Expt. Sta., Bul. 563, Aug. 1960; Bostwick, Don, "A Model for Yield Probabilities," unpublished paper presented to the GP-2 Technical Committee, Manhattan, Kans., April 1961.

[6] Bostwick, *op. cit.*

[7] Great Plains-2 Research Project statement (Organizing and Operating Dryland Farms in the Great Plains to Meet Variable Climatic and Changing Economic Conditions).

Similar results were found in the Southern Plains.[9] This does not mean adequate credit is always available for all needed farm adjustments, but only that short-run survival of the firm is not likely to be in jeopardy with the present credit situation. Furthermore, government programs which quickly furnish emergency feed supplies or other services during a drought increase the probability of short-run firm survival. Finally, the off-farm employment alternatives increase the chances for short-run survival. In summary, if a farmer's expected reinvestment income over several years is sufficient to replace equipment, debt repayment, etc., he need not be overly concerned about financial survival during a few "bad" years. Widespread foreclosure on farm mortgages, similar to those experienced during the first half of this century, are not likely to occur under our present conditions.

A more vital goal of Plains farmers is long-run capital accumulation. A farmer who organizes and manages his farm in such a manner as to maximize the amount of capital accumulated over time will be able to survive a series of "bad" years. Obviously the extent to which farmers desire and plan for maximum capital accumulation over time varies between farmers, as well as for a particular farmer over the life span of the firm.

Impact of Weather Variability on Farmers' Decisions

Apparently, farmers in the Southern Plains understand the type of weather uncertainty and yield variability which they face. Near the end of the severe drought during the 1950's, 82 dryland cotton farmers in the Southern Plains were asked to estimate the number of years in a 10-year period in which they would expect annual rainfall to be within specified ranges.[10] The expectations of farmers in the sample were not significantly different from the actual distribution obtained from U.S. Weather Bureau records on stations in the area of study. The study also showed that the farmers' expected distribution of cotton yields was not significantly different from the actual yield distribution for the 1916-1956 period at a local substation where variability in yields conforms closely to that which an individual farmer in the area might expect. It would be interesting to know if their expectations at the present time would approach the actual distributions as closely after several years of favorable weather conditions.

With this knowledge, what effect would the tendency for income to

[8] Bierman, Russell W., "Farm Credit and Farm Debts in the Great Plains," *Farming in the Great Plains,* USDA, Prod. Res. Rep., No. 50, May 1961.

[9] Moore, D. S., and Hildreth, R. J., *Adjustment Problems and Goals of Dryland Cotton Farmers on the High Plains,* Tex. Agr. Expt. Sta. MP-323, Jan. 1959.

[10] *Ibid.*

bunch into runs of "bad" and "good" years have on the allocation of resources over time? Knowing some "good" years are to come but not knowing when, major items of farm machinery may be used beyond the economic optimal length of life during drought years. Conversely, during a run of "good" years the farmer may decide to replace machinery too readily due to his favorable cash position. About one-third of the dryland cotton farmers in the Southern Plains study indicated that some replacement of major items of machinery such as tractors, combines, and cotton strippers would be profitable. However, very few farmers had plans to replace these needed pieces of machinery before making a "good" crop even though adequate credit was available.

Farm sizes in the study area had increased substantially (over 60 percent) from 1947 to 1957. However, the size of owned and rented farms remained almost constant during the 5-year drought period. These results suggest that a run of "bad" years curtailed the acquisition of more land. However, if a farmer anticipates that he is at the beginning of a run of "bad" years, it is not alarming that he decides not to purchase more land. In general, research in the Southern Plains indicates that decisions of farmers to acquire machinery and additional land are influenced by weather variability.

Suggested Strategy to Meet Weather Variability in Great Plains Farming

If there is a tendency for bunchiness of "good" and "bad" years, in the Great Plains, what strategy should a farmer employ in order to maximize capital accumulation? If the farmer considers short-run survival of the firm to be a minor problem, many of the traditional strategies suggested for managing a farm may not maximize capital accumulation. Product diversification for the purpose of reducing income variability has not received much attention in the Great Plains due to the limited number of production alternatives available and the often occurring positive correlation of yields. In fact, in a Nebraska study the addition of a second enterprise to wheat was found to increase the total absolute variation in income.[11] Feed and financial reserves are effective short-run survival strategies; however, they are less effective in the long run for Plains farmers. Although under certain conditions these strategies may contribute to maximum accumulation of capital, they are basically regarded as means of reducing the impact of individual "bad" years.

Flexibility is probably the most promising strategy that farmers in the Great Plains have for meeting weather variability. Flexibility may be

[11] Ottoson, Howard W. and Finley, Robert M., "Strategies To Meet the Hazards of Farming and Ranching in the Plains," Proceedings of Great Plains Agricultural Council, July 1960, pp. 140-164.

used in production plans both to lessen income variability from year-to-year and to increase the expected total value of the income stream. When a sample of Southern Plains farmers were asked about advice they would give a young farmer, 45 percent of them recommended "flexibility and adjust to weather."[12]

Starch described flexibility as the ability to "roll-up" and "unroll."[13] Great Plains dryland farmers are similar in this respect to certain plants which have built-in mechanisms for meeting unfavorable conditions and which allow them to take advantage of suitable growing conditions. For example, when the soil moisture at planting time is low, the farmer can "roll-up" by reducing certain cash crop expenses (e.g., fertilizer, insecticides). Conversely, with good soil moisture at planting time he can "unroll" and take advantage of the favorable conditions by using greater amounts of these yield-increasing practices.

By exercising flexibility one can withhold cash inputs as long as possible in order to gain more knowledge about the environment one faces. Thus, farmers can more nearly approach an optimal allocation of short-run assets. It is important to know at critical decision periods during the year what the chances are that certain climatic conditions will occur and the expected influence on yields. For example, suppose a dryland cotton farmer in the Southern Plains receives only 3 inches of preseasonal rainfall. He knows at planting time that the odds of obtaining over 150 pounds of lint are low. He may decide to allocate less cash expenses to cotton in such a year than he would during a year with abundant soil moisture at planting time. However, just because a farmer has more knowledge of yield expectations, it does not mean that he will always allocate cash expenses according to the most likely yield. The loss in cash expenses may be relatively low as compared to the returns of a "good" year. Hence, farmers tend to spend cash for certain crop practices even though the odds are high for a crop failure. For example, a farmer may "dust-in" his crop even though he realizes that the chances are high for a crop failure, especially if he must plant to maintain his allotment history.

Although Great Plains farmers may know at planting time that the year is not likely to be favorable for major enterprises of the area, opportunities to shift to more favorable enterprises are limited. However, while Plains farmers are largely committed to certain enterprises, they do have some freedom in choosing production practices. For example, a Southern Plains farmer might choose to plant his 100-acre cotton allot-

[12] Moore and Hildreth, *op. cit.*

[13] Starch, E. A., "Type of Farming Modifications Needed in the Great Plains," *J. Farm Econ.*, Feb. 1939.

ment in solid 40-inch rows during a year when soil moisture at planting time is above the average. But, if the soil moisture at planting time is particularly low and if additional crop land is available, he might find it profitable to disperse his 100-acre cotton allotment over 300 acres of cropland by skipping four rows between paired cotton rows (These skipped rows would not be counted as part of his cotton allotment). In other words, dryland farmers may delay important management decisions until the last minute to gain new information concerning yield expectations. Cash crop expenses may vary substantially from year-to-year according to the farmer's yield expectations at critical periods of the year. Although a cash crop expense and such practices as row spacings can be varied from year-to-year, farmers are not likely to make drastic shifts between enterprises.

Flexibility has been recommended to farmers in a general way during the past three decades as a strategy to meet weather hazards in the Great Plains. Also, there is evidence that this strategy has been widely used by Plains farmers. Although farmers are frequently advised to be flexible, rarely are they advised specifically how to be flexible. For example, "make a cheap crop during dry years" is recommending flexibility in a general way.

If a strategy to meet weather hazards in the Great Plains is to be of great value in management decisions, it needs to be a more precise recommendation than "just be flexible." The development of more precise managerial strategies to meet the complex climate in the great Plains is needed. There is a need for more knowledge concerning the relationships of production and the various attributes of climate. These relationships need to be estimated for different seasons of the year in order to be more valuable in management decisions. For example, with a given amount of soil moisture at a particular time and location, what are the expected yields for major crop enterprises under various types of production practices?

Certain factors of production such as fertilizer and insecticide can be adjusted at planting or even later, but adjustments in the use of other inputs often need to be made at some earlier date. Hence, we need yield expectations based upon soil moisture, not only at planting time, but also at earlier dates. For example, how well does soil moisture during certain periods of the year predict crop yields for the coming year? Economists will need to work closely with physical scientists in designing experiments for estimating these relationships.

DISCUSSION: IMPORTANCE OF WEATHER VARIABILITY ON MANAGEMENT DECISIONS

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Let me first of all add a hearty second to the plea of these authors for a statistically valid bunchiness test. Next let me concur in their hopes for the useable probability estimator that seems to be promised by the Markov chain theory. But this is, if anything, only a beginning. I hope that someone with a thorough command of mathematics will invent an extension of Markov processes to include bunches of 3 or 4 related years, rather than 2. We require such a tool more adequately to represent the decision space of dryland farmers. This, like n-dimensional matrices, may be beyond the mathematics of the moment, but how handy it would be.

The description of historical weather-related phenomena is a preliminary to the kind of decision studies in which many of us engage. As the authors suggest, we are not yet able adequately to describe these phenomena. We require hypotheses at least of the relationships between insolation, soil moisture, humidity, temperature, and various plant and soil characteristics which results in threshold conditions for crop survival and for production at various levels. I believe that such causal hypotheses could be purchased. The cost might run to several hundred thousand dollars worth of controlled climate laboratory, and 5 or more years worth of effort by a research team.

Most of us are economists, and are forced to make the usual assumptions about the random effects of weather variability on crop yields, in order to get on with the researching of decision choices under weather variability. But I believe the physical and biological scientists must devote some effort to enlarging our causal knowledge of the yield phenomena related to uncertain weather. Otherwise, we will continue to build our decision studies on what I think is a very sandy foundation. I suggest that we stir up and support them whenever such research is proposed. When we are supplied with valid physiological data, *then* we can effectively putter with economic effects, statistical decision gadgetry, and the like. I, for one, am haunted by the heroic assumptions I have made in this area, on the basis of complete ignorance.

The authors posit two goals of management: 1) short-run survival, and 2) long-run capital accumulation, discarding income stability altogether. I agree with this dichotomy only until someone finds out what the goals of Great Plains farmers really are. I suspect that they are not nearly so simple as this. I suspect we would find a hierarchy of goals, including

such non-economic goals as status and aesthetic satisfactions well up toward the top. We could test such a proposal ourselves, without having to wait on social psychologists.

But assuming the authors' dichotomy, I suggest that the two goals might be sought in terms of weighted priorities, rather than as successive single values. We might assign top priority to survival, both for management in the current year, and for decisions that would affect survival over the next 3 years or so. If and when this goal seems assured, or is not seriously compromised by the most probable weather of the next 3 years, the priority can be passed on to capitol accumulation.

The survival goal has a management horizon of a year or two into the future. The accumulation goal extends over a period of 30 or 40 years, beginning with the original organization of resources into the firm in question. I am suggesting that these goals, plus others as yet undefined, want simultaneous inclusion in the managerial decision model.

The studies of actual adjustments made by Great Plains farmers to bunches of good and poor weather years are quite interesting. We have an opportunity currently to continue these studies in the Northern Plains. But, in addition to these data, I would like to see some study of the attitudes and other psychological phenomena which underly actions. I would like to know how farmers' attitudes and goals have been adapted in response to, or in anticipation of, weather variability. My hypothesis is that psychological characteristics are the immediate cause of decisions, which sometimes give rise to actions, which we sometimes observe. Such data combined with a better physical understanding of weather-effects should allow us to build more refined decision models, and perhaps to suggest more appropriate managerial strategies for dryland farmers in the Great Plains. This I assume to be our single-valued goal as researchers.

USE OF WEATHER FACTORS IN SHORT-RUN FORECASTS OF CROP YIELDS

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CALL US the Crop Reporting Service, Crop and Livestock Estimates, Ag Estimates, or the Crop Reporting Board; and you will be correct. Although the name has changed many times, the basic service of issuing official estimates of the United States Department of Agriculture of livestock numbers, crop acreages and prospective production has continued to identify our work for over 100 years.

Forecasting production when corn is knee high, cotton just beginning to set bolls, and burley tobacco being transplanted is a vital part of our service. Regressions of final yield on current prospects are tools of major importance in our statistical workshop where forecasts of yield per acre are made. Current prospects which reflect the impact of weather, cultural practices, and other factors to date are independent variables in forecasting equations. The impact of weather and other factors to date, as well as thereafter, is reflected in the dependent variable, final yield per acre.

It is very evident, therefore, that weather and yield forecasting are inseparably linked and that crop-weather relations are of vital concern in our work. While irrigation, mechanization, and up-to-date cultural practices have given some measure of weather-proofing to crop yields, weather is still an important factor in determining yield per acre.

The fact that up until a few years ago the Weather Bureau was an agency of the Department of Agriculture was, no doubt, an expression of the close relationship between weather and agriculture. There have always been close ties between the Weather Bureau and Crop Estimates. Although the Weather Bureau is now a part of the Department of Commerce, working relations have actually been strengthened. In fact, joint weekly crop-weather reports are now issued for all States. In those reports, the weather portion is prepared by the Weather Bureau and the portion relating to crops prepared by our State Statisticians. Briefed weekly weather reports are wired to the Weather Bureau in Washington and a member of our staff prepares the National Summary on "Effects of Weather on Crops and Farm Activity" published in the Weekly Weather and Crop Bulletin issued jointly by the Weather Bureau and our Service.

These weekly crop-weather reports are making a major contribution in the area of crop-weather relations. The basic information on crop progress and farm activities is reported weekly, primarily by County Agricultural Extension Agents. The effect of weather on crops and

seasonal progress—percent planted, maturity stages, such as percent corn silked and percent harvested—as shown in these timely reports are not only of tremendous usefulness to our commodity Statisticians in providing the climate for making short-run forecasts but also to farmers and others concerned with Agriculture. Considerable effort is being directed toward standardizing these reports to make them even more useful in the future.

Since there is a logical cause and effect relationship between weather and crop yields, direct use of weather as a means of forecasting crop yields has been a challenge of long standing. Some of our earliest mathematical research in crop-weather relations consisted of simple correlation studies. In such studies, the final yield of a crop was charted against a single variable, usually monthly or total rainfall during a growing season or temperature during supposedly critical months. For some studies, the equation of the form,

$$Y = a + bX \tag{1}$$

and such statistical constants as the coefficient of correlation and standard error of the estimates were computed.

It is very seldom that a single weather factor accounts for all of the variation from year to year in the yield of a crop. These studies were largely exploratory, or educational, and proved to be of limited use in estimating yield, except for winter wheat in the Southern and Central Plains area. In the States comprising that area, rainfall is usually light and seldom heavy enough to reduce yields. Thus in most years a linear relationship exists, the greater the rainfall the higher the yield. Some years ago the simple rainfall-yield relations were of some use in estimating the yield per acre of wheat early in the season for that area. In recent years, however, factors other than rainfall have come into the picture and the simple relationship is not as dependable as heretofore.

Limitations of the simple correlation studies coupled with the challenge of improving early season estimates of yield brought multiple correlation studies to the forefront.

This technique involved fitting an equation of the form:

$$Y = a + b_1 X_1 + b_2 X_2 + \ldots + b_n X_n \tag{2}$$

to the data. In this equation, Y represented final yield and X_1, X_2, . . . X_n represented values of the various weather factors used. Considerable time and effort were expended in calculating such equations in the late '20's and early '30's. Grinding out an equation on a hand operated calculating machine was a tremendous experience. The electrically driven calculating machine was a godsend and greatly speeded up the work.

It was still a chore, however, to compute a three or four variable equation.

Fortunately, the "Bean Method" of graphic multiple correlation removed much of the drudgery from such work and weather-yield studies mushroomed. Curvilinear relations could be developed as easily as those for straight lines. Furthermore, the "Bean Method" was a logical extension of the simple correlation dot-chart procedure and gave the statistician an understanding of the effect of a combination of variables on yield that would have been difficult to get otherwise. By use of this method regressions of final yield using various combinations of rainfall, temperature, humidity, and other indices of weather were developed for most major crops by States.

During the late '30's detailed special crop-weather projects were carried out for cotton, corn, and wheat. The projects involved special crop-weather plots at a number of Experiment Stations and recording detailed plant and weather observations. Some exploratory work was also done at that time using complex equations. All of these studies added materially to the statistician's knowledge of crop yields in relation to weather. They showed the relative importance of weather by months, the effect of accumulated rainfall prior to the growing season and the general importance of factors other than weather.

While the correlations were significant and fairly high for some crops in certain States, the relationship when used in subsequent years would not be the same as for the years included in the study. For forecasting purposes, therefore, the previously observed relationships were misleading at times and generally much less reliable than estimates based on currently reported indices of yield per acre.

The failure of the *direct* approach in the use of weather was understandable. Working with a 15-to-20-year period, several weather factors, and mostly curvilinear relationships, degrees of freedom were comparatively small. Then too, changes in varieties, drainage, conservation, fertilizer, and other cultural practices and combinations of weather not adequately reflected in the regression period would come into the picture.

While the so-called *direct* weather procedure in estimating crop yields per acre has not been abandoned, the emphasis has been shifted to what may be termed the *indirect* or supplemental weather approach.

In the present estimating program considerable use is being made of multiple regressions in estimating yield with reported condition and/or yield, precipitation, or indices of weather as variables.

The general equation for wheat would be of the following order:

$$Y_c = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 \qquad (3)$$

Y = final yield per acre

X_1 = condition
X_2 = reported yield
X_3 = precipitation prior to estimating date
X_4 = precipitation after estimating date
X_5 = time (trend)

Multiple regression equations and charts using combinations of current prospects reported by crop correspondents and precipitation as variables are being used for winter, durum, other spring wheat, corn, and soybeans for some months and areas. In general, precipitation data contribute two factors to the equations—(1) accumulated precipitation for selected months before the forecast date and (2) precipitation for the following month or combination of months. Precipitation after date has to be estimated from a knowledge of long-time trends, seasonal patterns in recent years and long-range weather forecasts. Long-time averages are not used except as a last resort. For most early season estimates, precipitation after date (X_4) accounts for the major portion of the variance. The level of the indicated yield, therefore, is heavily influenced by the estimate of precipitation after date and the procedure becomes very subjective for current forecasting. To avoid some of this difficulty corresponding equations omitting precipitation after date are being developed for supplementary use.

In appraising current prospects, crop reporters take into account seasonal progress, diseases, insects, quantity of fertilizer used, and other cultural practices. The reported condition or yield, therefore, reflects the composite effect of weather and cultural practices to date and reporters' evaluation of such factors on final outcome. When these measures of current prospects are used as variables along with actual precipitation to date and after date, the regression coefficients measure the contribution of the components used. Any persistent tendency for farmers to under or over-estimate for a given pattern of rainfall, therefore, is appropriately adjusted.

In this approach we are not necessarily limited to use of actual weather data as a variable. Other factors which are, in themselves, measures of weather or effects of weather are also used. Estimating procedures for cotton and tobacco are examples of such methods.

Cotton fruits on a rather rigid time schedule in two dimensions, vertically and horizontally. For corresponding positions on the plant, it sets fruit up the stalk at about twice the outward rate along a given fruiting branch. With the fruiting rate fixed and the vegetative growth rate affected by weather and other conditions, the ratio of fruit to total vegetative growth is quite variable. Under lush growth conditions, internodes are long and the plants are large in relation to the quantity of fruit. Con-

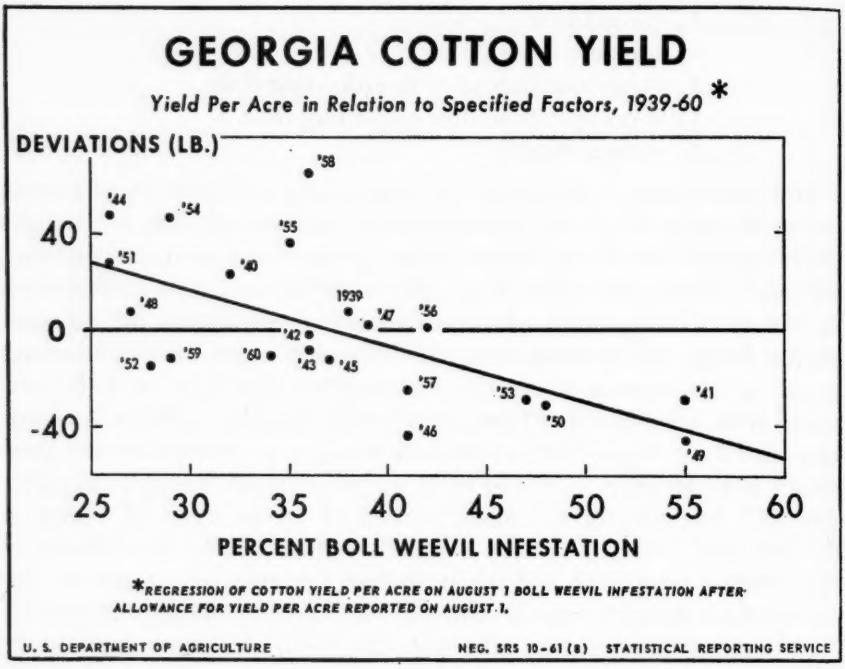

CHART 1

versely, in periods of drought, internodes are short and the set of fruit is heavy in relation to the vegetative mass. Farmers tend to overstate prospects when plant growth is lush and understate during drought periods. It is necessary, therefore, to use an appropriate correction factor in our forecasting procedure.

While the adjustment is needed primarily for weather conditions, the correction factor actually used is boll weevil infestation. Weather and weevil infestation are inversely correlated and the single correction factor makes simultaneous adjustments for both weevils and weather. High temperature and drought tend to control weevils and limit plant growth. Under those conditions adjustments are positive; that is, yields turn out better than expected currently. On the other hand, cool, wet weather promotes weevil infestation and excessive plant growth and regression adjustments are negative. (Chart 1)

The yield forecasting procedure used for burley tobacco is an interesting variation of the same general principle. To those directly involved in forecasting tobacco yields, it has been apparent over the years that during the growing season producers tend to overstate the relative yield and condition of the crop when soil moisture is abundant and, conversely,

understate its potential when drought conditions prevail. There seems to be a natural cause for this on the part of producers since the crop responds with luxuriant growth during moderately wet weather but remain nearly dormant during periods of drought. The crop has unusual ability to recover after a drought but tends to be deceptively thin and light when moisture is abundant.

To adjust for those factors we use pasture condition as one of the variables in the multiple regression equation. Pasture condition is readily available and serves as an index of soil moisture. As was the case with cotton, persistent tendencies for specific patterns of weather are adjusted. (Chart 2)

During the past 5 years a pilot operating program involving probability area samples for use in estimating crop acreages has been under test in several States. For wheat, corn, and cotton, the project also included making specific counts and measurements on plants in sample areas of fields around the first of the month during the growing and pre-harvest seasons for use in estimating yield per acre. The sample areas were harvested, and weights and moisture content determined.

The project was stepped up to the operating level in 10 southern and

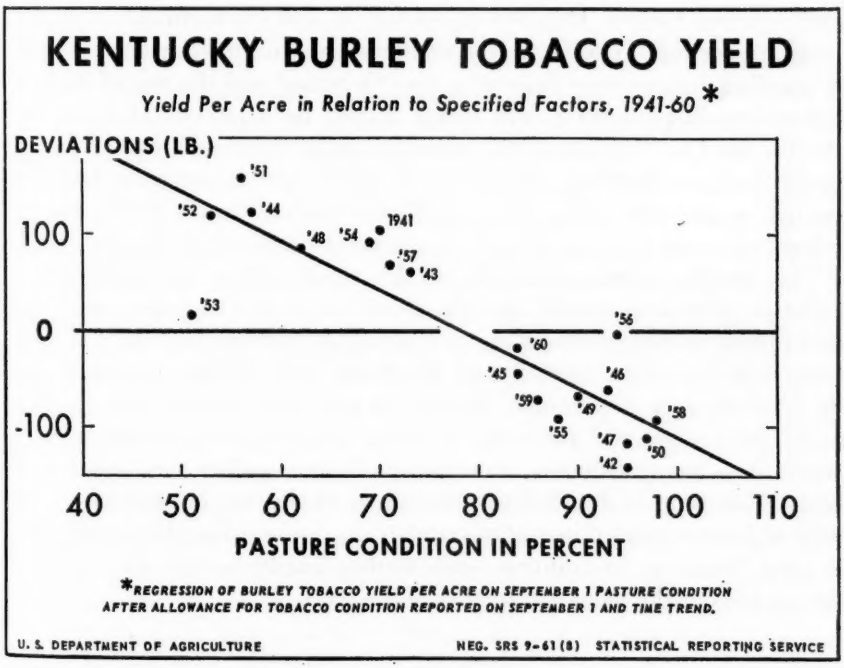

CHART 2

5 Corn Belt States in 1961. Long range plans call for additional States to be brought into the program as funds become available.

These objective counts and observations add new facets to estimating yield per acre. They also reflect the impact of weather and cultural practices to date and may be of help in bringing to light additional information on crop-weather relationships.

For many crops, the initial forecast for the season is made while plants are still in the vegetation stage. Under those conditions, unusual weather can cause considerable change before harvest. For such crops, reliable long-range weather forecasts would be a major break-through in improving estimates, but these seem doubtful in the near future.

There is some question as to whether use of weather data just prior to, or at time of harvest would result in more reliable estimates of yield per acre. At that time, the correlation of yields per acre as reported by crop reporters and actual yields is very high. Long range weather forecasts, crop-weather relations, and objective crop observation, however, hold considerable promise for improving early season yield estimates, especially when viewed in the light of electronic data processing.

At present, there is great need for special studies, similar to but more extensive than those conducted in the late '30's, relating major crop yields and weather factors. Detailed phenological and environmental observations are needed. In addition, the relationship of dry matter accumulation to weather factors over the entire growth period and the use of such relationships in predicting crop yields should be explored. These special studies need to be broken into several areas of interest: (1) phenological events such as planting, emergence of plants, fruit emergence, and fruit counts by maturity categories, and (2) the mechanism of growth and development over time as related to accumulated weather factors.

The weather observations should be made within the experimental fields or plots and should include air and soil temperatures, maximum and minimum temperatures, net radiation, evapotranspiration, soil moisture, frost formation, rainfall, and dewpoint. Most of these studies should be conducted at Experiment Stations as was done in the '30's. In some cases good use could probably be made of controlled environments to accumulate many different weather conditions within a relatively few years. This type of detailed information is vitally needed in conjunction with objective yield observations and is also of considerable importance in crop breeding. In addition, such studies would be valuable information on the development and quality of the crop.

DISCUSSION: USE OF WEATHER FACTORS IN SHORT-RUN FORECASTS OF CROP YIELDS

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Weather Bureau, U.S. Department of Commerce
Iowa State University

It is good to hear that the State and national weekly weather and crop bulletins are making a major contribution in the area of crop-weather relations. This is an excellent example of the ultimate in inter-agency cooperation.

Mr. Morgan has indicated that emphasis in his organization now is on using the weather information *indirectly* in estimating crop yields, apparently primarily to adjust crop reporters' appraisals of current prospects. For some estimates he even replaces the actual climatic information with a biological index or integration of the weather such as in the interesting cases of adjusting reported cotton prospects from boll weevil infestation and tobacco yield forecasts from pasture condition. Finally, the pilot program of making specific plant counts and measurements in sample areas goes straight to the plant for the yield estimates. I have no doubt that this method, given sufficient funding for the sampling and correlation of plant measurements with final yields, will provide as good results as any we will ever hope to obtain with weather data alone. After all, the plant experiences and integrates the same weather recorded only in part by our instruments as well as the complex plant-soil-weather interactions and the side effects of insects and disease.

This does not mean, however, that weather-crop yield research is not important. First, in Mr. Morgan's general equation for wheat, he has indicated that precipitation after estimating date (X_4) accounts for the major portion of the variance in most early season estimates. Second, it may be more economical to collect and analyze weather data from stations already in existence and serving other purposes than to support an extensive crop sampling job each year, *if* the eventual weather-yield relations are sufficiently accurate and precise for the purposes of crop estimating. Third, we have many years of weather data with which, given the sufficient crop estimating equations, we can compute climatologically the probability of any set of crop yields. While this would have most advantage in long-range planning, this might well feed back into the short-run forecasts in permitting the yield forecaster to select "analog" years.

Mr. Morgan's pilot sampling project is in no immediate jeopardy because we have a long way to go before we can approach the accuracy which is required in crop yield estimating with weather data alone. Progress is being made, however, and there is an increasing amount of

work on weather effects on crops in many parts of the United States and abroad. Agronomists, physiologists, agricultural engineers, and agricultural economists are finding that the varying environmental effects have severely limited the value of their previous research. They see the need for including the weather in their work. Most researchers agree that the fundamental work will have to be through teams of agronomists, plant physiologists, and meteorologists on the soil-plant-weather continuum from a physiological approach. Until sound relationships are established, however, empirical studies will have to be continued to obtain approximations of the weather effects.

In these empirical studies it is important that consideration be given to selecting reasonable variables. Even with the long history of crop-weather-relation-experience outlined by Mr. Morgan there are still those who are satisfied with only a "quickly available" weather measurement, that is, annual rainfall from a single station, to include with their "n" other variables in a "hopper analysis" whether or not there is any physical reason for this variable to be effective. This shot-pattern type of study will never contribute directly to crop-weather research; in fact, if the researcher has any faith in his study, it may discourage others from more resourceful and meaningful work.

Since both Mr. Morgan's remarks and mine might seem negative on our current progress in the *direct* use of weather information for short-run forecasts, let me point out that one of the best of the "empirical study" class that I have seen is the one by Parks and Knetsch[1] with an economic treatment by Knetsch[2] in your own *Journal of Farm Economics* (1959). Parks and Knetsch made use of water balance computations to compute a drought-day statistic which they weighted according to the relative importance of drought at the different stages of corn growth and development. They also considered the concomitant effect of nitrogen fertilizer. With linear and quadratic nitrogen terms, a linear, weighted drought-day, and a drought-nitrogen interaction term, they accounted for 97 percent of the variation between 15 replicate means (5 treatments, 3 years) on a Lintonia soil in Tennessee. Even though the number of variables relative to the number of observations limit the conclusions from their study, this is an excellent methodology. In their work, however, only a single drought base was used. The plant's physiological growth was considered restricted only on days on which the water balance computations showed no available soil moisture, i.e., soil moisture at or below the "wilting point" of about 15 atmospheres.

[1] Parks, W. L. and Knetsch, J. L., "Corn Yields as Influenced by Nitrogen Level and Drought Intensity," *Agron. J.* 51: 363-364, June 1959.

[2] Knetsch, Jack L. "Moisture Uncertainties and Fertility Response Studies" *J. Farm Econ.* XLI:70-76. Feb. 1959.

Denmead and Shaw[3] in a potometer experiment, present the now more acceptable and reasonable view of a "sliding" wilting point depending on the atmospheric stress or the "evaporation sink." Figure 1 shows that transpiration or moisture loss from the crop increases with increasing soil moisture until it reaches a leveling-off point consistent with the available energy. On an overcast day with a low energy level, typified by Aug. 5, 1959, transpiration can continue at a low, fairly constant rate from this soil moisture almost down to the "wilting point" of 22 percent for this

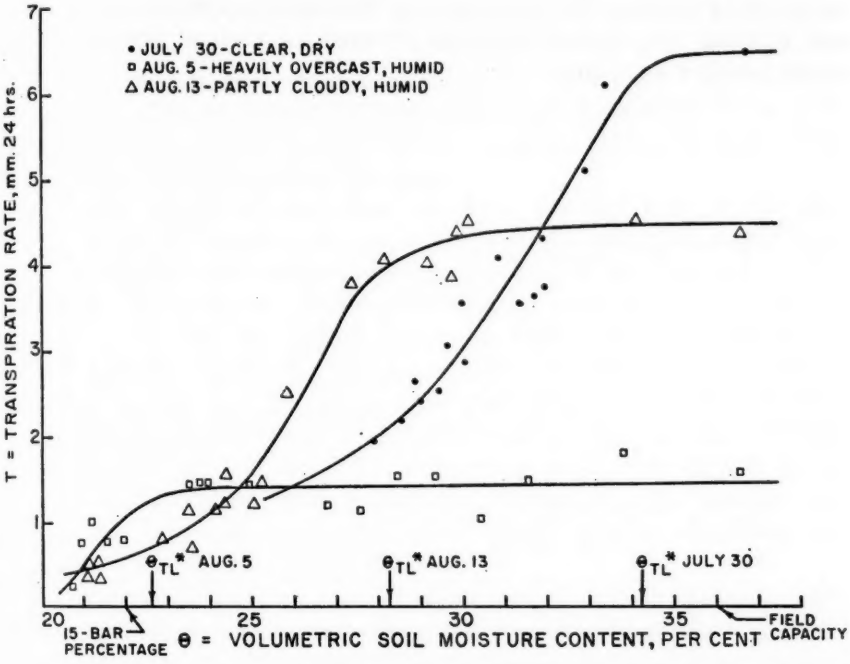
• JULY 30-CLEAR, DRY
□ AUG. 5-HEAVILY OVERCAST, HUMID
△ AUG. 13-PARTLY CLOUDY, HUMID
T = TRANSPIRATION RATE, mm. 24 hrs.
θTL* AUG. 5
θTL* AUG. 13
θTL* JULY 30
15-BAR PERCENTAGE
θ = VOLUMETRIC SOIL MOISTURE CONTENT, PER CENT
FIELD CAPACITY

FIGURE 1. ACTUAL TRANSPIRATION RATE AS A FUNCTION OF ATMOSPHERIC STRESS AND SOIL MOISTURE FOR COLO SILTY CLAY LOAM. θ_{TL}^* ARE THE ESTIMATED TURGOR LOSS POINTS OR WILTING POINTS.

Colo silty clay loam, below which the cells lose turgor and the plant wilts. On a sunny day with high energy or atmospheric stress, typified by July 30, 1959, the plant wilts just below the field capacity for this soil! Each time that the corn crop wilts, the final yield is reduced. This shows the complexity of counting drought days in that there is no stationary physio-meteorological base from which to compute our water budget,

[3] Denmead, O. T. and Shaw, R. H. "Availability of Soil Water to Plants as Affected by Soil Moisture Content and by Meteorological Conditions" to be published in *Agron. J.*

even on soils of the same water holding capacities with crops of similar rooting depths.

We do not need to wait, however, for either the completely defined soil-plant-weather continuum or for the accurate long-range weather forecast to utilize weather factors in forecasting crop yields. Those empirical relations which appear most promising will continue to be used, and to decrease the subjectivity of Mr. Morgan's early season estimates we can use the most probable subsequent weather as determined from climatology. Perhaps, we could pass on the exact picture to the yield forecast recipient by utilizing the water supply forecasting approach, i.e., a forecast carrying the current prospects forward for each of several subsequent weather outcomes.

FARM LABOR AND LABOR MOBILITY

CHAIRMAN: H. J. MEENEN, UNIVERSITY OF ARKANSAS

THE FARM LABOR FORCE: RECENT TRENDS AND FUTURE PROSPECTS

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Economic Research Service, USDA

IN 1950, some 15 billion man-hours were used on U.S. farms in the production of food and fiber. By 1960, the total input of farm labor had dropped to about 11 billion man-hours, a decline of 27 percent. By 1965, aggregate man-hours of farm labor are expected to decline to 9 billion on an annual basis.[1] The changing composition of the farm work force accompanying this dramatic decline in labor input, and some of its implications are the subject of this paper.

The most significant fact about the farm working force in the last decade is that the number of persons employed on farms—no matter how they are counted—has declined very sharply both in absolute and in relative terms. Farm workers made up about 12 percent of the total civilian labor force in 1950 but only 8 percent in 1960. The equivalent of 1.8 million full-time farm jobs disappeared between 1950 and 1960. During the same decade over 1.4 million farm units were consolidated or taken out of production. In 1960, U. S. agricultural production was achieved with about 1.5 million fewer farm operators and nearly 400,000 fewer unpaid family workers than in 1950. In contrast, average monthly employment of wage and salary workers on farms was over 1.8 million, not significantly different from the 1950 level.[2]

Because of the growing relative importance of wage workers in agriculture we will devote our time to pointing out some significant developments in the composition and characteristics of the hired farm working force and their implications for the next few years.

A considerable amount of data on hired farm workers are available on a national basis. National surveys of the hired farm working force have been made in most years since 1945. These surveys are conducted for the Economic Research Service by the Census Bureau at or near the end of the year. In addition to the regular questions on labor force status asked of all respondents in a national sample, all persons who have worked on farms for wages at any time during the preceding year are asked a series

[1] Johnson, Sherman E., *Agricultural Outlook in the 1960's.* A paper read at the Annual National Outlook Conference, Washington, D.C. Nov. 1960.

[2] These employment estimates are based on data from *The Monthly Report on the Labor Force,* U. S. Department of Labor.

of questions concerning their employment and earnings at farm and nonfarm work. Estimates derived from these surveys differ from other estimates of hired farm employment in two important respects: (1) the reference period is an entire year and therefore the estimates provide a measure of the total number of different individuals who are employed on farms at any time during a given year, and (2) data on individuals are obtained and can be tabulated by demographic and socioeconomic characteristics for analytical purposes.

Since 1945, the size of the hired farm working force has varied from about 3 million to 4.3 million workers. In the last 4 years (1956-1959) the total working force has not dropped below 3.6 million. Allowing for variations in estimates due to sampling errors and for improvements in the survey design and procedures which would be expected to provide better coverage of the population, there appears to be no appreciable trend in the size of the hired farm working force in recent years.[3] Foreign workers, mostly Mexicans brought into the United States each year to work on farms under international arrangements, are not included in the foregoing estimates. Most of these workers return home after the harvest and are not in this country at the time the annual survey of the hired farm working force is made. The use of foreign labor on U.S. farms is a significant factor in the farm labor market. However, the role of imported workers and its implications for domestic farm workers will not be discussed because imported workers are the subject of one of the other papers on this program.

Changes in Composition of Hired Farm Working Force

Perhaps the distinguishing characteristic of the hired farm working force is the extreme variability among workers in their degree of attachment to the farm work force. About 40 percent of all persons who did any farm work for wages in 1959 were casuals, i.e. workers employed on farms less than 25 days. Over a third were seasonal workers getting from 25 to 150 days of farm wage work during the year and about 10 percent were regular workers employed from 150 to 250 days. Year-round workers, those employed 250 days or more, made up 13 percent of the work force.[4]

The evidence from recent years points toward increasing instability in agricultural employment. Year-round farm workers make up a smaller proportion of the total work force now than in the years just after the

[3] For a description of concepts, methods and recent changes in the Current Population Survey, see *Current Population Reports*, Series P-23, No. 5, Bureau of the Census, Washington, D.C., May 1958.

[4] Unless otherwise noted, the data in this and succeeding sections are taken from various issues of *The Hired Farm Working Force*, Econ. Res. Serv., USDA.

end of World War II. Employment of year-round workers has dropped about 25 percent while employment of casual farm workers has increased about one-third from the early post-war levels.[5] During the same period, the employment of regular workers has not changed significantly. Larger farms, mechanization, field processing and other factors which reduce harvest time and lower the producers' risks in processing highly perishable crops have all contributed to the heavier demand for short-term workers.

In certain areas of labor surplus, notably in the South, farm workers have for many decades ranged far from their home communities to work on farms in other areas. These migratory workers make up about 12 percent of the hired farm working force. Not counted in this estimate are the nonworking dependents of migrants—both those traveling and those left at home—and the foreign workers brought into the country on a temporary basis. Many migratory workers make definite work arrangements with employers before leaving home, but some, called "free wheelers" start out with only a vague notion of where and when they may find employment.

Earnings of Hired Farm Workers

Despite the migratory workers' efforts to maximize their farm employment by moving from one labor market to another, their earnings over the year average lower than those of hired farm workers who work only in their home area.[6] In the period 1949-59, male migrants earned less in cash farm wages than nonmigrants in all but 2 of the 6 years surveyed and earned substantially less in 1959. Male migrants averaged $782 and male nonmigrants averaged a little over $1,000 from farm work in that year. Each group earned about the same amount in cash wages at nonfarm wage work, but in total days worked during the year—at both farm and nonfarm wage work—the local workers were employed 188 days compared to 156 for the migrant workers. Migrants who worked mostly in their home locality averaged over twice as many days of farm wage work and also earned considerably more than other migrants.

About 450,000 workers, nearly all males, were employed 250 days or

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[5] Based on changes between averages for the years 1945-49 and 1956-59.

[6] For discussions of conditions of migrant employment, see for example, *Migratory Farm Workers in the Midcontinent Stream*, Metzler, W. H., and Sargent, F. O., Prod. Res. Rep. No. 41, Agr. Res. Serv., USDA, 1960; *Migratory Farm Workers in the Atlantic Coast Stream*, Larsen, O. F., and Sharp, E. F., Cornell Univ. Agr. Exp. Sta. Bul. 948, 1960; and *Migratory Agricultural Workers in the United States*, Jorgenson, J. M., Williams, D.E., and Burma, J. H., Grinnell College, Grinnell, Iowa, 1961. For a report on recent efforts of the Federal and State Governments to alleviate conditions of migratory workers, see *Report to the President on Domestic Migratory Farm Labor*, The President's Committee on Migratory Labor. Washington, D.C., 1960.

more at farm wage work in 1959. These year-round workers exhibit a high degree of attachment to the farm labor force. Most of these workers have experience and skills very much in demand in the farm labor market. Moreover, they are largely insulated from the competition of imported workers who are engaged for the most part in seasonal labor. The relatively good position of year-round workers is evident from trends in the farm wage structure. Annual earnings of year-round male workers have doubled since the early post-war period. In contrast, annual cash earnings from farm work of all male hired workers has risen about 40 percent. Annual earnings of female hired workers, who make up over one-fourth of the total work force, are no greater now than they were in the late 1940's.

All of the above comparisons are in terms of current dollars. The rise in real earnings has been less, of course. Changes in living costs have erased about 30 percent of the gain in annual farm wage earnings for the male workers and real earnings of female farm workers have actually declined.[7]

We have discussed lack of stability of wage employment in agriculture as a characteristic of the demand for agricultural employment. Employment instabiliity also may be viewed from the supply side of the labor market in terms of the relative importance of farm wage work in the overall employment experience of the individual. For this purpose, we may use information from the annual survey of the hired farm working force on the "chief activity" of each respondent during the year.[8]

The proportion of the total hired farm working force dependent primarily on farm wages for a living has declined fairly steadily in the last dozen years. The latest figures available (1959) show about one-fourth of the total hired farm working force was chiefly engaged in farm wage work. Most of these workers had no other source of income and we can conclude that about 20 percent of the total hired farm working force are wholly dependent on farm wages.[9] Their average cash earnings for the year were $1,558 for 238 days of farm wage work, or an average of $6.55 per day.

All of the figures on earnings given here are cash wages and do not include the value of perquisites. Perquisites were received by nearly one-

[7] Based on changes in the index of prices paid by farmers for family living items, *The Farm Income Situation*, Econ. Res. Serv., USDA, July 1961, Table 8H.

[8] The categories of chief activity for hired workers (with 25 days or more of farm wage work) are: farm wage work, nonfarm work, other farm work, unemployed, keeping house, and attending school. About one-third of all hired farm workers with 25 days or more of farm wage work are out of the labor force the major part of the year.

[9] A few of these workers may have had some income other than wages such as income from operating a farm or other business, pensions, rent, interest, etc.

third of the hired farm working force in 1959. This is about the same proportion as was reported in the 1945 survey of the hired farm working force. This is in marked contrast to the situation for nonfarm workers most of whom not only receive various fringe benefits but also enjoy legal safeguards in the form of unemployment compensation and minimum standards for wages, hours and working conditions.

Inter-industry comparisons of wage rates and earnings are always subject to misinterpretation and especially so when adequate data are lacking. We need to know more about the structure of farm wage rates, the extent to which they reflect skills and experience, the effects of nonfarm wage rates on farm rates, and the significance of perquisites in the agricultural wage structure.

Some information on differentials in earnings of farm labor by skill level was obtained in the latest survey of the hired farm working force. Hired workers were classed according to whether they worked mainly with machines, livestock, or as manual laborers. The highest daily earnings, $7.70, were reported by male machine workers who received no perquisites. Male workers without perquisites and engaged mainly in hand labor averaged less than $6.00 per day. As this type of survey is repeated and more detailed wage data are obtained, our knowledge of the structure of farm wage rates and the effects of technology on the wage structure and the farm labor market should grow accordingly.

Considerably more information on other aspects of the hired farm working force has been obtained in recent surveys. To list a very few findings from the latest survey, we have found that, each year, over one-fifth of all male hired workers are new entrants to the hired farm working force. Since the size of the work force has not varied appreciably in recent years, we can infer that a corresponding proportion of male hired workers are moving out of the hired farm working force each year. About 15 percent of all male workers had been employed as hired farm workers for 20 years or more.

Shifting our attention to farm employers, we found that in 1959, 205,000 farm operators employed migratory workers and about 74,000 hired migratory workers exclusively. In 1959 the average cash wage bill for the 1.9 million farms in the U. S. that employed and hired workers was about $1,300 and about 2.5 percent of all farm employers paid out $10,000 or more in cash wages to hired workers in that year.

Future Prospects and Implications

In the face of further technological gains and consolidation of farms there appears to be general agreement that the total farm labor force (inclusive of farm operators and unpaid family workers) will continue to

decline in the foreseeable future.[10] A decline in total labor input of farm labor is almost a certainty even with an expected increase in agricultural output, but the effect these trends will have on individuals in the hired farm labor market is much less certain. The general economic health of the Nation as reflected in the availability of nonfarm jobs for displaced and new farm workers is of particular significance. A sustained high level of unemployment in the nonagricultural sector will tend to dampen the flow of such farm workers to nonfarm employment. Low skill levels and inadequate education and training will become even greater handicaps in the labor market of the future. For farmers and unpaid family workers who remain in agriculture because other job opportunities are lacking, the results will be reflected as in the past, in subsistence farming and underemployment. As productivity has risen, the aggregate amount of farm employment available for hired workers has declined without a corresponding drop in the size of the hired farm working force. In the labor market this means an almost constant upward pressure on unemployment levels and less employment over the year for individual farm workers. When we realize that the aggregate man-days worked by all hired farm workers in 1959 (about 4,000,000 persons including imported workers) are equivalent to only about 1.2 million year-round farm jobs, the economic consequences for hired workers is apparent.

Despite this fact, of course, the demand for large numbers of seasonal workers in agriculture will continue. Although the aggregate demand for farm labor will decline, migratory workers will be needed in many areas, because of the continuing heavy demand for seasonal workers. Part-time farming will increase to the extent that nonfarm job opportunities are available to underemployed farm operators. Rural industrialization and other efforts to bolster employment in depressed rural areas under the auspices of the new Area Redevelopment Administration should be of particular significance in areas of surplus rural labor. Rural industries can also provide an intermediate training or retraining stage for farm workers shifting to industrial occupations and facilitate their adjustments to a new way of life.

The upward trend in the number and proportion of short-term hired farm workers, which is likely to persist, will mean a continuation and possible aggravation of the casual nature of employer-employee relationships in commercial agriculture. It also points to increasing difficulties that need to be overcome in the efforts being made to achieve a measure of stability in the farm labor market. The stepped-up rate in the decline

[10] See for example, *Agricultural Outlook in the 1960's, op. cit.*, and "The Migratory Worker in the Farm Economy," Levine, Louis, U.S. Dept. of Labor. A paper read before a meeting of the Industrial Relations Research Assn., Chicago, Ill., May 1961.

in the number of farms aggravates the agricultural labor supply problem, since some of the farm operators and family members have no alternative other than entering the hired farm labor market. In addition, there is of course, the ever-present accessions of new workers to the farm labor supply. The most recent Census of Agriculture reveals a continuation of the upward trend in the number of part-time farmers. Many more off-farm employment opportunities are needed in order to reduce existing levels of underemployment among low-income farm families, particularly in the South.

It is evident that there are manifold challenging problems that call for effective policies and programs of action directed toward the various segments of the farm labor force. These include measures specifically directed toward hired workers—migratory and nonmigratory—and measures directed toward a solution of underemployment problems of the small low-income farmers. These are problems that continue to engage the attention of the Departments of Labor, Agriculture, and other agencies. The discussant of this paper and his associates in the Department of Labor have given much thought and attention to these problems.

DISCUSSION: THE FARM LABOR FORCE: RECENT TRENDS AND FUTURE PROSPECTS

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In recent meetings of the American Farm Economic Association, there have been discussions, from time to time, of human resources and mobility in agriculture, centering mainly about the adjustment and mobility of farm operators and family members in a situation of rapidly declining manpower needs. It is highly appropriate that this session give more specific attention to the employment and mobility of the hired segment of the farm labor force. This discussion is particularly timely since the American public has become keenly aware of problems associated with underemployment and waste of human resources resulting from changing technology and uneven economic growth, both in the farm and nonfarm economy.

The talk presented by Mr. Maitland brings into sharp focus the instability of employment and low earnings which characterize the hired farm working force. These facts constitute a very good backdrop for understanding the problems that exist in the farm labor market. On the one hand, workers seeking regular employment, adequate compensation, and some measure of economic security cannot rely on occasional and inter-

mittent low-wage farm jobs. On the other hand, employers needing hired workers for short seasonal periods are often not in a position to offer full-time regular work. Meeting the seasonal labor needs of the farmer and at the same time providing the worker with continuity of employment are objectives that are not always compatible. Obviously, this has important implications with respect to the types of workers who seek farm jobs, employer-employee relationships, and other aspects of the labor market.

With highly seasonal labor requirements, it is a major problem in most agricultural areas to reconstitute a work force each year from among the unemployed persons out of the labor force, and others with only marginal attachment to the labor force. In many areas, local labor supplies are not adequate and workers from other areas and even other States must be recruited. This involves perseason work commitments and housing and transportation arrangements that are unique to agriculture.

Within the farm labor market, institutions have developed to aid in the employment process. Most important of these is the Federal-State system of public employment offices. Because of its nationwide coverage, nonfee service orientation, and its fund of labor market information, the employment service is generally in a good position to marshall a labor supply each year from local, intrastate, interstate, and foreign sources. Through preseason contacts, the employment service attempts to maximize continuity of employment for migratory workers by scheduling a series of jobs in various work locations.

Other intermediaries in the farm labor market include crew leaders and labor contractors who seek out jobs for their crews and arrange for transportation and housing. Packers and food-processing companies as well as associations of growers provide recruitment services for farmers in some areas.

Mr. Maitland presented evidence of the increasing concentration of employment in a relatively small proportion of farms. The character of commercial agriculture is rapidly changing; the small, family-operated farm is being absorbed and consolidated into large-scale, business-type operations. Census data show that more than one-half of all farms hire no labor whatsoever, and only about 5 percent are significant employers. Nonfarm employers are assuming an importance that is not adequately reflected in Census data. For many commercial fruit and vegetable crops, it is now common practice for growers to relinquish all control over cultivaing and harvest labor to processing companies.

Because of the short-term nature of most hired farm employment, employer-employee relationships are more impersonal and casual than in most industries. The traditional concept of paternalistic and familistic

relationships between the farmer and the hired hand must now be replaced by new concepts. Under the piece-work system that prevails in most crop areas, there is often little or no direct contact between employers and workers. Concepts of training, supervision, job tenure, and welfare plans, common in industry, are almost completely lacking.

One of the most important developments affecting the farm labor market in post-war years has been the expansion of industries and suburbs into the countryside. With improvements in communication and transportation, farm and nonfarm labor markets are becoming increasingly interdependent. Under these circumstances, it would be expected that farm businessmen would find it necessary and in their own best interests to adopt employment practices more nearly in line with those of other employers competing in the labor market. Actually, however, several factors have impeded this development:

1. One is the presence in the labor market of several hundred thousand foreign workers brought into the United States each year under programs of the U. S. Department of Labor for temporary agricultural jobs. Despite safeguards to protect employment opportunities and wages of U. S. farm workers, the use of so large a group of alien labor inevitably has direct and indirect consequences on the labor market. Department of Labor studies have shown that, in areas where Mexican workers are employed, there has been a tendency for wages to remain stable or to lag behind the rate of increase of farm wages generally.

2. The use of foreign labor alone cannot explain the disparities in farm and nonfarm wages and working conditions, since they are used only to a minor extent in most States. Another deterrent to adjustment in employment practices has been the vast reservoir of unemployment and underemployed in rural areas, particularly in the South. In spite of tremendous outmigration, we still have chronic and persistent labor surplus problems in many rural areas that are becoming more serious because of high birth rates, lack of skills and education for adjustment into nonfarm unemployment, particularly in unskilled labor categories.

3. A third reason for delaying needed improvements is that the possibilities of mechanization have not been fully exhausted. Many employers still have the alternative of shifting to machines rather than adjusting wages and working conditions of farm laborers. Thus wages in cotton harvesting tend to be lower than the unit cost of producing an equivalent amount of cotton by machine, taking into account depreciation, operating costs, and grade loss. In many areas, the break-even point at which cotton farmers will shift to machines is said to be $2.50 per cwt. for picking.

4. Finally, of course, there is the relentless seasonal pattern of produc-

tion. In many regions, agriculture cannot conceivably provide stable employment except for a small nucleus of skilled workers. In other areas, however, the increasing importance of large-scale, vertically integrated enterprises and farm labor associations suggests the possibility of providing more continuous and stable employment by cooperative efforts. Bold, new, imaginative approaches for dovetailing farm jobs with closely related packing, processing, storage, and distribution activities, and extension of unemployment insurance to farm workers are becoming more realistic.

It is in the economic interest of the agricultural industry to establish employer-employee relationships on a sounder basis so that the farm work force can be stabilized and attract to it qualified workers.

THE INCIDENCE OF INCREASING WAGE COSTS IN FARM PRODUCTION[1]

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MY PAPER considers the question of which functional groups are likely to bear the costs of the increasing wage rates for hired labor that may be expected in agriculture. I am interested in whether these increasing labor costs will be absorbed by land, other labor, farm entrepreneurship, distributors, consumers, unemployment of some of the labor in question, or several of these together. There is much interest in this subject presently, because of four developments, actual or contingent: (1) Upward pressure on farm wage rates, from the "pull" of better-paying, easier, or more pleasant nonfarm jobs; (2) possible revision or termination of the programs under which otherwise inadmissible foreign laborers are annually brought into the country for seasonal farmwork; (3) possible extension of minimum wage legislation to include hired farmworkers; and (4) possible unionization of hired farmworkers or of some groups thereof.

Before becoming enmeshed in the analysis, however, let us try to get a clear perspective on this problem. Thinking about such emotion-charged questions can be tricky. What I buy, I like to get as cheaply as possible. When I buy, directly or indirectly, the labor services of a fellow human, it is "convenient" for me to forget two simple facts: (1) What I pay out as a labor cost is received by another person as his labor income; and (2) the phenomenon of increasing real returns to labor necessarily accompanies a "properly" developing economy in which material levels of living are rising and are not too disparate among individuals. When returns to labor are somewhat sluggish, modern civilized societies try in various ways to rectify such a maladjustment and the associated injustices, presumably because of deeply held values in these matters. To be sure, advice from the long-range, broad, social viewpoint runs the risk of sounding gratuitous. No doubt such a detached attitude is easier, *if* one does not have to meet the proverbial payroll. On the other hand, it is also easier to be complacent about relative poverty—whatever its causes—if one presently enjoys at least comfortable middle-class status.

This paper has three sections: (1) The theoretical analysis; (2) some general and qualitative conclusions about the practical consequences of increasing wage costs in farm production; and (3) some quantitative

[1] The helpful criticisms of Reuben W. Hecht, Earle E. Gavett, Nelson L. LeRay, William C. Pendleton, Lois S. Maier, Robert L. Bunting, and E. J. Nesius are gratefully acknowledged.

estimates that shed light on the question of the magnitude of the problems of adjusting to higher wage rates in farm production.

Theoretical Analysis

The theoretical analysis will consist largely of an enumeration of possible economic adjustments that may occur in various situations of increasing wage rates for hired farm labor. It is intended as a checklist. In any specific real-world problem situation, we would expect several but not all of these adjustments to be present. How broad or narrow an analysis should be for any particular problem, how elaborate or simple, and what elements should be included will, of course, depend upon the facts of each particular situation and the ways in which the answers are to be used.[2]

It seems to me useful to distinguish 10 possible kinds of economic adjustments to an increase in wage rates for hired farm labor. Six of these are largely long-run and four are more or less short-run.[3] As each of these is identified in turn, its applicability and implications will be discussed briefly.

Long-run adjustments

The first two long-run adjustments to higher wage rates are closely related and can be distinguished only conceptually.

(1) Substitution of other inputs for labor, under the *existing* technologies of production.

(2) Substitution of other inputs for labor, under the *new* production technologies that come into being in response to the increase in wage rates for hired farm labor.

The idea of the "new" production technologies, which distinguish (2) from (1), is that an increase in the cost of the labor input encourages both private firms that sell substitute factors and also public agencies to step up research directed toward improving mechanization and other substitutes for labor. Under adjustment (1), which considers only the technologies that *exist,* the rise in hired wages results in an increase in cost of production, but a lesser increase than would occur if no substitution

[2] This analysis is stated so as to apply specifically to the situation of a rise in wage rates for hired farm laborers. With appropriate minor modification and deletions, the analysis may also be applied to the other tenure categories of the farm workforce in situations where increases in labor productivity are occurring either within or outside agriculture, or both. These modifications would involve replacing the hired wage rate with the idea of alternative opportunities for farm labor, i.e., the marginal opportunity cost of farm labor.

[3] The terms for length of adjustment period are used in the customary Marshallian sense. In the short run the firm is not able to vary its rate of use of some factors of production, but in the long run the rates of use of all factors of production are variable.

of other inputs for labor were possible. Under adjustment (2), which takes account of new technologies derived from research induced by the wage increase, cost of production would certainly be lower than with only the substitutions possible under the old technology; and the new cost could even be lower than cost of production before the wage increase.

(3) Farm operators will substitute a smaller number of more skilled workers for a larger number of less skilled workers.

This comes about in slightly different ways and with different efforts on employment, depending upon the nature of the wage increase. A minimum legal wage or unionization of unskilled workers increases the price of unskilled labor relative to skilled labor by fiat. Unless workers were previously paid less than their marginal value product, unionization or imposition of the minimum wage induces farm operators to replace unskilled labor with other inputs and skilled labor. Therefore, it results in some unemployment of unskilled workers. On the other hand, the "pull" of nonfarm jobs or a reduction in the importation of foreign workers will create a "tight" labor market and induce farm operators to adjust their choices of farm enterprises and combinations of inputs, with the smaller labor input probably becoming more skilled. Adjustments in enterprises and inputs will increase the marginal value productivity of labor and will not result in unemployment of hired farm laborers, unless operators mechanize to a greater degree than is indicated by relative factor prices.

(4) The prices farmers receive for labor-intensive products will increase, and consumers will switch from farm products requiring more hired labor to those requiring less.

The effect of a wage increase on rate of production of each of the various farm products depends jointly upon consumer preferences for and supply conditions of each product. Costs of the several categories of labor are, of course, elements of the supply conditions for each particular product. For many farm products, we may expect an increase in cost of production to be at least partly passed on to processors, distributors and/or (more likely) consumers. This is so because the price elasticity of demand for labor-intensive food products together is less than for individual categories of labor-intensive foods.

Extension of the idea of this adjustment yields two corollaries. One emphazies possible international shifts in production.

(4a) Consumers shift from labor-intensive farm products that are domestically produced to those produced in foreign countries.

Such shifts would be limited by transportation costs and import restrictions. The other corollary highlights possible shifts in farm tenure.

(4b) A drastic reduction of the output of a particular labor-intensive farm product that can't be mechanized, with the remaining output produced by small-scale family-type enterprises.

This applies when some farm people put a high value on entrepreneurship; and an increase in hired wage rates causes consumers to shift largely to another crop, which becomes less expensive because its production can be mechanized.

(5) A reduction in the return to particular farmland and fixed capital, if these inputs have no economically attractive alternatives other than for production of a farm product with a high labor input.

This adjustment has reference to a labor-intensive farm product produced on land that does not have at least another closely competing use. Such land is therefore a "residual claimant" in the distribution of income from this production. Although this idea may be relevant to particular situations, it does not have general and widespread applicability.

(6) An increase in the marginal physical productivity of the same or similar hired farm laborers.

This adjustment might result from either or both of the following: (a) Higher real wages enable workers to have better nutrition, housing, and health services, which may possibly improve workers' general health, physical vigor, and mental alertness. (b) Higher real wages improve workers' attitudes toward their jobs and their feelings about the farm operators for whom they work. The practical relevance of this consideration is doubtless limited. Certainly, a more effective long-range way of increasing labor productivity is to improve the general and vocational education and to raise the aspirations of workers.

Short-run adjustments

The remaining four adjustments to increased wage rates for hired labor are for the most part short-run in nature.

(7) A "shock effect" on farm operators, who become more efficient in their utilization of hired farm labor.

This adjustment assumes that before the rise in wage rates of hired farm labor, operators were not quite minimizing their cost of producing a given output. Such a situation comes about as an accumulation of separate increases in inefficiency in the use of labor, each increase going unchecked because of habit, inertia, and the fact that operators have other interests in addition to money profit. A rise in the hired wage rate suddenly increases the cost of these accumulated inefficiencies in use of hired labor, and the farm operator is shocked into reorganizing his production, especially his use of labor. This principle probably applies to many real-world situations but to only a limited extent in each case. It cannot be applied repeatedly in any particular situation during a short period of time without implying that farm operators are completely uninterested in money profit.

(8) A reduction in the residual return to the management and unpaid

labor of farm operator families producing crops requiring relatively much hired labor.

This adjustment applies to the extent that an operator does not alter his choice of products and/or production methods in accord with the rise in the wage rate for hired labor and to the extent that family labor and management either have few and inferior alternatives within and outside agriculture or do not take advantage of their better alternatives.

(9) A reduction in the amount of work hired laborers are willing to do, because with increased wage rates they can earn enough to satisfy their few and simple needs in a shorter period of time.

This is the idea of the "backward sloping" supply curve of labor. Certainly it has some applicability for limited and transitional situations. However, because modern media of mass communication are so ubiquitous and so effective, I doubt that large numbers of workers will for very long retain such a simplicity of felt needs.

(10) Numerous transitional difficulties and advantages for particular individuals and groups.

Transitional adjustments to a rise in wage rates for hired farm labor, some entailing acute personal hardship, usually take time, because (a) human beings are often slow to understand the significance of particular events and to act accordingly, and because (b) some adjustments are only possible in the long run in which all durable inputs (except bare "Ricardian land") become variable when they are replaced. One such interesting adjustment is the possibility that an advantage may accrue to manufacturers of labor-saving farm equipment. After and because of an increase in wages of hired farmworkers, some manufacturers may be able to capture a greater "quasi-rent" (or "monopoly profit") from the sale of their equipment.

General Conclusions

Differences in demand and supply conditions among farm products preclude sweeping and definitive statements about the incidence of higher wage rates in farm production. Several general conclusions of significance, however, follow from the preceding analysis, especially adjustments (1) through (4).

First, it is not at all obvious or certain, as is frequently suggested, that for most farm products the ultimate incidence of higher farm wage rates falls largely on the farm operator.

Second, particular farm products may be vulnerable to higher wage rates. This is the situation of farm products which in consumption are close substitutes for each other but in production are each susceptible to widely differing degrees of substitution of capital and other inputs for labor. A general increase in the wage rate for hired labor will cause an

important shift from the farm product whose labor requirements cannot be reduced to that whose production can be mechanized.

Third, particular farming regions may be vulnerable to increased wage rates for hired labor. This is the case of an area that is capable of producing only one important farm product but that cannot adopt a new labor-saving mechanization made profitable by a rise in wage rates. If mechanization is feasible in other areas producing either this farm product or others that are close substitutes for it in consumption, the first area will be forced to accept a lower return to its land, fixed capital, and other less mobile inputs, whether or not production also actually shifts out of the area.

Fourth, the tendency of a minimum wage or unionization of unskilled farm laborers to result in unemployment has significant policy implications. Should such measures be adopted, they must be accompanied by social action to raise the productivity of displaced workers, if these workers are to be re-employed.

Fifth, long-range measures to increase private and social investment in human beings ought to be considered perhaps as alternatives to the minimum wage and unionization of unskilled farm laborers or at least as accompanying long-range policy. Such measures to raise real labor productivity would reduce the future need for minimum wages and other welfare measures. Of if such long-range action accompanied a minimum wage and unionization of the unskilled, it would reduce some of the disruptions associated with the latter measures. Admittedly, however, economic considerations are only part of the broad context of a social problem. Political considerations encompass many aspects of the problem besides the economic aspects. There is the view that public support may be less available for the "purist" approach of first adopting long-range social action to raise real labor productivity than for such short-term approaches as minimum wages and unionization of the unskilled. Even so, the final economic outcome of the latter approach may be more than merely applying palliatives to symptoms. Any unemployment resulting from minimum wages or unionization of the unskilled may serve to dramatize the need and generate the political support for both short- and long-range measures to raise labor productivity.

Quantitative Estimates

The likely magnitude of the problems to be encountered in adjusting to higher wage rates in farm production is a question of practical importance. Some light can be thrown on this question by noting whether labor costs bulk large or small in the production of individual farm products.

For this purpose, we may consider crude estimates of what proportion

the value of all farm labor per unit of farm product is both of prices received by farmers and of retail prices paid by consumers. All farm labor here includes operators, members of their families, and hired workers. These estimates, shown in the accompanying table, are for certain

COMPARISON OF VALUE OF ALL FARM LABOR PER UNIT OF FARM PRODUCT WITH PRICES RECEIVED BY FARMERS AND PRICES PAID BY CONSUMERS, SELECTED CROPS AND AREAS, 1959.

Crop and area	Value of all farm labor per unit of farm product as a percentage of—	
	Prices received by farmers	Retail prices paid by consumers
	Percent	*Percent*
Green peas for freezing, Wisconsin	8	3
Sweet corn for canning:		
Wisconsin	11	2
Oregon	18	4
Lettuce, fresh:		
Monterey County, California	16	4
Imperial County, California	23	5
Potatoes, fresh:		
Northeastern States	10	4
Mountain States	8	3
Cotton:		
Delta States	27	[1]
Southern Plains States	30	[1]
California	15	[1]
Strawberries, fresh, Eastern Shore, Virginia	30	11
Strawberries for processing, Marion County, Oregon	59	18
Green beans, fresh:		
Eastern Shore, Virginia	31	13
Colquitt County, Georgia	26	10
Green beans for freezing:		
Eastern Shore, Virginia	61	11
Marion County, Oregon	53	12
Cabbage, fresh:		
Eastern Shore, Virginia	37	8
Colquitt County, Georgia	26	4
Tomatoes, fresh:		
Eastern Shore, Virginia	25	3
Colquitt County, Georgia	13	2
San Joaquin County, California	17	5
Tomatoes for canning:		
San Joaquin County, California	41	5
Sugar beets for sugar:		
Lake States	18	7
Mountain States	18	8
Pacific States	18	10

[1] These percentages for cotton are very small for most of the large variety of uses of cotton.

Percentages are approximations estimated largely from the following: Published and unpublished data on labor requirements (of Econ. Res. Ser., USDA); the composite monthly farm wage rate by States (of the Crop Reporting Board, USDA); prices received by farmers for each commodity and producing region (published and unpublished USDA figures); and retail prices as reported by the Bureau of Labor Statistics for leading cities.

This table was prepared with the assistance of Earle E. Gavett, Econ. Res. Serv., USDA.

farm products in particular producing areas, selected from a group of products that are primarily labor intensive.

These data suggest, for one thing, that the value of all inputs of labor at the farm level is an important part of the farm price of the commodities examined. It ranged from an eighth to a third for most of the farm products observed but was more than a half for a few. Therefore, farm operators probably have good cause to anticipate that the short-run process of adjusting to higher wage costs may be difficult.

These data suggest also that the value of all inputs of labor at the farm level is a relatively small part of the retail prices paid by consumers. It was under a tenth for most of the selected labor-intensive farm products. Therefore, increases in consumer prices of food resulting from increases in labor costs would be moderate, even if farm operators did not substitute other inputs for labor and if all of the cost of the increased return to labor were passed on to consumers.

The theory described in the first section suggested that over the long pull only a part of the increases in farm labor costs is likely to be absorbed by farm operators. History suggests that this will be a small part, because in the past the increases in the prices of most purchased farm inputs have been so substantial that these increases could not possibly have been absorbed in large part by farm operators. Comparing the present with the 1910-14 base period, we find that wage rates for hired farm laborers are more than six times the base level; prices paid by farmers for all commodities purchased (including interest, taxes, and farm wage rates) are almost 3 times the 1910-14 level; and prices received by farmers for all farm products sold are almost 2½ times their level in the base period. Part of the gap between prices received and paid by farmers is due to changes in technology.

The estimates in the table also show that the labor input as a percentage of farm price sometimes varies appreciably among different regions producing the same farm product. Cotton is conspicuous in this respect. In part, this variation in the importance of the labor input reflects regional differences in wage rates and the availability of farm labor. Labor-intensive methods of production are used where farm wage rates are low, and labor-extensive processes are used where farm wage rates are high. These regional differences in the percentage that the labor input is of the farm price of a particular farm product imply something else. Should there be any equalization of wage rates among regions because of greater upward pressure on wages in previously low wage areas, important regional shifts in production are likely.

DISCUSSION: THE INCIDENCE OF INCREASING WAGE COSTS IN FARM PRODUCTION

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A major portion of the paper presented by Dr. Maier is devoted to a theoretical analysis of "possible economic adjustments that may occur in various situations of increasing wage rates for hired labor." Although I can find little fault with the theoretical analysis, *per se*, there are certain explicit and implicit assumptions underlying the analysis that can be questioned. Theoretical abstractions are often too simple to encompass the entire situation of a group of producers. Consequently, the determination of the incidence (where the ultimate burden lies) of increasing wage costs are apt to be very general and perhaps incorrect for a number of producers. The generality of the theoretical analysis makes it exceedingly difficult to determine the incidence in specific situations. It would have been more enlightening to me if Dr. Maier had devoted most of his paper to an attempt to determine the incidence of increasing wage costs for specific groups of commodities and producers.

Much of the following discussion will be concerned with examining some of the basic assumptions underlying Dr. Maier's analysis. Where appropriate, examples will be used and an attempt will be made to indicate the incidence of increasing wage costs.

The adjustments, effects, and incidence of an increase in farm wage costs on farm operators, consumers, and hired labor, as presented by Dr. Maier, might be summed up as follows. For producers he indicates that the answer to an increase in farm wage cost is to mechanize (substitute capital for labor). The producers not able to mechanize their production will bear the brunt of the increase in wages. Thus, the incidence of increasing wage costs will fall most heavily upon nonmechanized labor-intensive operations and will be reflected in lower returns for land, fixed capital, family labor, and management. Output of labor-intensive products will fall drastically, in the long run, with the remaining output produced by small-scale family-type farms. For consumers, he indicates that they will pay higher prices for labor-intensive products. In addition, they will switch from labor-intensive farm products to less labor-intensive products. However, in the general conclusions, he indicates that the "ultimate incidence" may rest largely on others than the farm operator. With respect to hired labor, he indicates that their marginal productivity will be increased. In the long-run, mechanization and changes in enterprises will not result in unemployment of hired farm labor, and more skilled labor, and less unskilled labor will be required.

In order to arrive at the above conclusions, Dr. Maier must have assumed a *very large* increase in the wage costs for farm labor. Wage rates for hired labor in the United States increased by 44 percent between 1950 and 1959. Yet the output of many labor-intensive crops has not been drastically reduced but has actually increased and is expected to increase even more. This has been in the face of lower prices received by farmers. As indicated by Dr. Maier, a minimum wage in agriculture at the approximate level of the present average wage would probably have more effect on the location of production than on total output. For example, wage rates in California are already twice those of some States in the Union.

It appears to me that a drastic reduction in output of labor-intensive products need not take place. With a substantial increase in population and real income expected in the long run, the demand curve for many labor-intensive products might shift a considerable distance to the right. The elasticities of the demand and supply functions are important in determining the incidence of a wage increase. It is quite simple to construct a model in which higher wage rates can increase the net revenue of producers. If this were true, the return to land and fixed capital would not decrease in the long run. In addition, where crops are produced under contract the price paid to the farm operator is apt to be partly based upon production costs (including labor costs).

Not much was said concerning the incidence of increasing wage costs for the mechanized or low labor using products. For supported products, the parity formula contains the price paid for hired farm labor. Thus, assuming a constant percent of parity, part of the incidence would not lie on the farm operator.

There is little empirical evidence to support the hypothesis that the output of the labor-intensive crops will be produced by small-scale family-type farms. At the present time the trend is in the opposite direction. This is partly because many of the labor-intensive crops have a high income variability which discourages the smaller farmers from producing these crops. In addition, it appears that a number of producers are increasing the size of their labor-intensive operation in order to obtain more per unit revenue or more total revenue (with the same per unit revenue). It is doubtful if these conditions will be reversed in the long-run.

Although a substantial increase in wage costs will result in the mechanization of a number of operations, there appears to be less possibility of mechanization reducing seasonal labor needs than might be imagined. Farm operators have not mechanized some operations in the production and harvesting of labor-intensive crops even though they could reduce costs under the known technology. One reason for this is that by not

mechanizing, employment is furnished to workers needed in the area for farm work in some other time period. The magnitude of the wage increase is important in determining whether or not operations that can, will be, mechanized under the present technology. It appears that the uncertainty of an adequate supply of seasonal labor may be as important as a wage increase for hired labor in determining whether or not certain operations are mechanized.

Dr. Maier asserts that consumers will switch from farm products requiring more hired labor to those requiring less hired labor. This, I believe, will occur to some extent but perhaps not as much as indicated by Dr. Maier. For example, let us consider a commodity that is processed as a different product and is also used for fresh consumption. In a number of instances, it will be much easier to mechanize the harvesting of a crop for processing than for fresh consumption. For example, it has been possible to mechanize the harvest of peaches and tomatoes for processing but, at least for the present, not peaches or tomatoes for fresh consumption. An estimate of the cross-elasticity of demand for such substitute commodities would be helpful in attempting to determine the incidence. However, I doubt if canned tomatoes are a good substitute for fresh tomatoes.

I agree in the most part with Dr. Maier on his statements concerning the hired farm labor force. The ultimate burden will lie on society as well as on the unskilled workers in training these displaced workers for reemployment in or outside of agriculture. However, it is important to note that there may be a considerable amount of unemployment of hired farm labor resulting from changes in inputs and enterprises if the unskilled workers are not given or willing to accept help in finding other employment.

The figures in the table presented by Dr. Maier indicate that the cost of farm labor as a percent of prices received by farmers is approximately twice as great for the processed commodity as for the same commodity sold for fresh consumption. For example, in the Eastern Shore area of Virginia this percentage is 31 percent for fresh green beans but 61 percent for green beans for freezing. Thus, the farmers producing products for processing would be more adversely affected by an increase in wage rates than farmers producing for the fresh market. It is indeed fortunate that the products for processing have a better opportunity to be mechanized.

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THE USE OF FOREIGN LABOR FOR SEASONAL FARM WORK IN THE UNITED STATES–ISSUES INVOLVED AND INTEREST GROUPS IN CONFLICT

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THE RECRUITMENT of foreign citizens to perform seasonal farm work was undertaken to meet the shortages of farm labor during World War II. It was generally believed at the inception that the program would be temporary, to be terminated at the end of the war or shortly thereafter. Instead, it has expanded. The total number of foreign workers employed in agriculture initially did not greatly exceed 45,000, but in recent years the peak annual employment has been in excess of 300,000 workers. Over the years, the number admitted has been somewhat larger than the number employed at any one time. In the year ending June, 1960, it was 477,207.[1] Slightly more than 95 percent of foreign workers recruited are citizens of Mexico.

Foreign farm workers are becoming more important in relation to the total hired labor force and as a share of the seasonal labor force employed in certain crops and States. In 1951, Mexican workers at peak accounted for 4 percent of the hired farm labor force; the comparable figure for 1958 was 11 percent. In the five major Mexican-using States the percentages were 13 for 1951 and 31 for 1958.[2] In the production of lettuce, foreign farm workers provide slightly more than 75 percent of the labor at the peak of the season. Twenty-five to 50 percent is provided for several other crops.[3] Although the program was initiated to meet temporary shortages of seasonal unskilled field hands, substantial numbers are employed in the operation of machinery and in year-around jobs.[4]

With each succeeding year, the program gains a prominence and a permanence well beyond that contemplated when it was initiated. Workers provided under the program are "coming to be regarded, in many places, as a permanent part of the farm labor supply."[5]

Issues

The issues raised by recruiting foreign workers for United States farms are of an economic, social, and political nature. This discussion, however,

[1] U. S. Congress, House of Representatives, Committee on Agriculture, *Extension of Mexican Farm Labor Program*, Hearings before the Subcommittee on Equipment, Supplies and Manpower, 87th Congress, 1st Session (Washington: 1961) p. 333.
[2] *Farm Labor Fact Book*, U. S. Dept. of Labor (Washington: 1959), p. 176.
[3] *Extension of Mexican Farm Labor Program*, 1961, *op. cit.*, p. 316.
[4] *Ibid.*, p. 295.
[5] *Ibid.*, p. 291.

will focus mainly on economic issues and interest groups, although it is acknowledged that the social and political consequences of the foreign farm worker program may be as or more important.

The major economic issues can be grouped under the following headings: (1) impact on wages, (2) impact on farm operational patterns, (3) impact on the incomes of farmers who don't use foreign labor, (4) impact of the program on the economy from which the workers are recruited, (5) impact of the program on the operation of the farm labor market, (6) the terms under which foreign labor is employed, and (7) the restriction of foreign labor to seasonal hand labor tasks in agriculture.

1. The wage, as well as several other issues, has its origin in the law under which Mexican citizens are recruited. Public Law 78 (as amended) provides in part that foreign farm workers recruited under that law shall not

> be available for employment in any area unless the Secretary of Labor has determined and certified that (1) sufficient domestic workers who are able, willing, and qualified are not available at the time and place needed to perform the work . . . , (2) the employment of such workers will not adversely affect the wages and working conditions of domestic agricultural workers similarly employed, and (3) reasonable efforts have been made to attract domestic workers for such employment at wages and standard hours of work comparable to those offered to foreign workers.

Disagreements regarding the impact of the foreign farm worker program on wages and wage rates have been rather sharp. Part of the disagreement lies in different assumptions regarding supply of seasonal farm labor. It is often assumed that the supply of seasonal farm labor is a sharply defined quantity of labor that has certain attributes and qualities which set it off from the labor supply of other sectors of the economy. It is argued, at least in the short run, that the foreign farm worker program, which requires foreign workers be paid prevailing wage rates, will not reduce wages; foreign farm workers are recruited after the domestic workers are fully employed. According to this line of reasoning, wage rates would rise if foreign workers were not forthcoming, but a rise in the short run would not materially increase the number of workers willing to accept such employment.

The assumption of a fixed quantity of seasonal farm workers does not exclude the possibility that higher wage rates and earnings would bring forth a slightly larger quantity of labor. But the number of persons able and willing to accept such employment is only remotely a function of wage rates; it is largely a matter of economic and cultural change. The net effect of cultural and economic forces in the economy has been to reduce the number of persons able and willing to perform seasonal farm work. The supply of seasonal farm workers is not likely to be increased by

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attempting to draw labor from other farm and nonfarm tasks through higher wages, even in the long run.

On the other hand, it is also frequently assumed that seasonal farm workers are drawn from a common labor pool available to all employers. It is also assumed that the identification of various ethnic groups with seasonal farm work is artificial and temporary. The quantity of labor that is obtained for seasonal farm work depends upon the wages and working conditions offered. Any device that augments the seasonal labor supply will decrease the wage rate that prevails.

The impact on wages is moving towards a settled issue. At the 1961 Congressional hearings Matt Triggs, assistant legislative director, American Farm Bureau Federation, cited hourly wage rate data to show that wage rates had increased in all States in which Mexican national workers were used.[6] He did not assert as he had done in earlier hearings "that the Mexican farm-labor program has not adversely affected farm wages. . . ."[7] In the spring of 1961, Mr. Holleman, Assistant Secretary of Labor, testified that the Mexican national program has been having a depressing impact on wages, which he asserted were the "automatic adverse effect of the pressures of an inexhaustible supply of labor on the operations of a free labor market."[8] This conclusion was not challenged.

2. The impact of the foreign farm worker program on the pattern of employment and farming operations is closely related to the wage rate issue but is more directly concerned with the long run trend. The continued operation of the program over the years, presenting as it does a perfectly elastic labor supply—once the program is in operation, any number of workers can be obtained without any change in the terms of employment—reduces the incentives to modify or reduce the seasonality of employment either through technology or through a crop pattern. It tends to insulate employment standards of agriculture "from those in the remainder of the national economy."[9] Mr. Holleman took the same position in his testimony this spring. Reflecting on the past he observed: The use of foreign labor "has obviated the need for employers to take those steps which they normally would, in labor shortage areas, to attract and retain a domestic labor supply."[10]

3. In testimony before the Congressional Committees, witnesses who

[6] *Ibid.*, p. 4.

[7] U. S. Congress, House of Representatives, Committee on Agriculture, *Mexican Farm Labor Program*, Hearings before the Subcommittee on Equipment, Supplies and Manpower, 84th Congress, 1st Session on H.R. 3822 (Washington: 1955) p. 58.

[8] *Extension of Mexican Farm Labor Program*, 1961, *op. cit.*, p. 291, see also pp. 293, 318, 319.

[9] Varden Fuller, *Labor Relations in Agriculture*, (Berkeley: Institute of Industrial Relations, Univ. of Calif., 1955) p. 45.

[10] *Extension of Mexican Farm Labor Program*, 1961, *op. cit.*, p. 291-292.

are unfavorably disposed toward the program argue that the use of foreign labor depresses the income of the farmer who uses his own and his family labor in competition with the producer who use foreign farm labor.

On the other hand, those witnesses who are favorably disposed toward the foreign farm worker program invariably point out that few farmers who produce specialized fruit and vegetable crops are able to meet their seasonal labor requirements with family labor. They argue that those producers who do not use foreign labor but who hire domestic labor find the program advantageous because it tends to minimize labor shortages that might otherwise exist. They also note that many small producers employ foreign farm labor. The small operators would be more severely pressed by a termination of the program as they would be less able to mechanize their operations than would be the larger producers.

The farmer who uses only his own and his family labor in the production of crops in competition with farmers who employ foreign farm labor faces economic forces which tend to make his labor income correspond with the wages of foreign farm workers. On the other hand, these forces are diluted because few fruit and vegetable farmers use their own and their family labor exclusively.

In the long run, it is possible that even the large-scale operators will not achieve an enduring benefit from the program. Insofar as the benefit gets capitalized into the land values, the beneficiaries of the program are those who own the land while the program was being built into the land values. On the other hand, the new owners of the land have a capital investment in the continuation of the foreign farm worker program—insofar as the continuation of the program is a factor in maintaining land values.

4. The impact of the foreign farm worker program on the economy of the country from which the workers are recruited is an issue upon which there is also substantial disagreement. Witnesses appear regularly at hearings and give testimony favorable and unfavorable regarding the impact of the program on the economy of Mexico. (Mexico, of course, receives most of the attention since 95 percent of the foreign workers are recruited in that country.) At one of the most recent hearings, two studies[11] were introduced, one supporting the proposition that the program was beneficial to Mexicans and the economy of Mexico, and the other raising serious questions regarding the benefits of the program to the economy of Mexico.

5. The question of whether the program tends to increase the stratification of the farm labor market so that certain types of tasks come to be

[11] *Extension of Mexican Farm Labor Program,* 1961, *op. cit.*, pp. 42-47, 355-370.

identified with certain ethnic groups is a social issue that has immediate and long run economic implications. For example, there is a question: Does the widespread and continued employment of Mexican nationals in certain occupations result in attaching a social stigma to them? Insofar as domestic workers avoid these tasks certain crops and operations will come to depend increasingly on the availability of foreign workers. Thus, a program that at its inception contributes to a reduction in risk of availability of labor supply could evolve to a situation that presents a greater risk than that faced initially. It was noted that in the production of lettuce, the foreign farm worker program tends to loom very large, providing more than 75 percent of the peak seasonal employment.

6. Since the terms under which foreign farm workers are employed compared favorably with those offered domestic workers, it is frequently suggested that the same terms be offered to domestic workers. Employers have usually held that such suggestions are impractical or impossible to carry out.[12] On the other hand, there are instances where domestic workers are employed under contracts comparable to those offered foreign workers.[13]

7. Over the years, it has been generally understood that the employment of foreign farm workers is to be restricted to unskilled seasonal tasks. A consultant group asked by the Secretary of Labor in 1959 to study the foreign farm worker program found that many foreign workers were being employed in semi-skilled and skilled jobs. Following the committee recommendation, the Department of Labor suggested a modification of the law governing the recruitment of Mexican workers to protect the wages and working conditions of domestic workers from deterioration that might result from such employment.[14]

Extensive employment of foreign workers in skilled and semi-skilled tasks would no doubt have an erosive impact on the wages and working conditions of domestic workers. Yet individual employers of foreign farm workers find it difficult to see that permitting a foreign worker to operate a truck or a tractor for a day or two results in any serious damage–except occasionally to the equipment.

Interest Groups in Conflict

The employers who recruit and employ foreign farm workers have been the dominant interest group. Over the years, they have favored and secured a continuation of the program. And in recent years, many em-

[12] This issue was taken up at the Congressional Committee hearings this past spring, *Ibid.*, pp. 292-321, 346-348.

[13] *Migratory Labor in American Agriculture*, Report of the President's Commission on Migratory Labor, 1951. (Washington: 1951) pp. 113-114.

[14] *Extension of the Mexican Farm Labor Program*, 1961, *op. cit.*, pp. 318-319.

ployers have favored making the program permanent. In the short run, at least, the program reduces the risk of labor shortage, providing as it does a supply of reliable labor at the prevailing wage. Their interest conflicts quite directly with that of the domestic farm worker.

The domestic seasonal farm worker also has a direct and personal interest in the program. Insofar as the program delays or inhibits wage increases and a betterment of employment conditions, a restriction of the program would serve his interest. Unions of farm and nonfarm workers have favored either a restriction of the program or its termination.

The Mexican government has viewed the program as temporary;[15] however, individual citizens of Mexico have been willing to come to work in the United States in more than ample numbers.

The farm operators who do not hire farm labor, foreign or domestic, have on occasion appeared before Congressional Committees to present their point of view, but for the most part, others more frequently have spoken in their behalf. Although a very small percent of U.S. farmers participate in the foreign farm worker program—mainly the commercial producer of fruits, vegetables, and cotton—most of the major farm organizations have supported the continuation of the program without substantial modification. This position of the farm organizations is in harmony with the U. S. farmer's identification of his interest with his entrepreneurial rather than with his labor role.

The Department of Labor, having the responsibility to administer the program, faces the necessity of reconciling employer and employee interest groups. Over the years that it has been responsible for the administration of the program, the Department has been concerned that the program not forestall increases in earnings and standards of employment that would result from the normal working of economic forces.

Conclusion

In conclusion, I might observe that the decline in the number of domestic workers willing and able to perform seasonal farm work and the reluctance of Mexico to regard the program as permanent suggest that the ultimate solution for the problems associated with seasonal tasks in agriculture lies in the elimination of these jobs through technology.

However, the vast development of technology that has taken place in the past 18 years or so has not been paralleled by a decline in the foreign farm worker program. The reverse has been the case. Technology has been developed and utilized in agriculture without regard to overall impact on the seasonality of employment. It is also probable that such will be the case until a publicly supported program is developed which

[15] *Extension of Mexican Farm Labor Program*, 1961, *op. cit.*, p. 330.

places emphasis on the development and adoption of such technology as will reduce the seasonality of employment.

This last statement assumes that appropriate new technology can be generated as a matter of public policy. It assumes that new technology is not episodic or random in occurrence. The history of the development of agricultural and nonagricultural technology lends much support to this assumption.

DISCUSSION: THE USE OF FOREIGN LABOR FOR SEASONAL WORK IN THE UNITED STATES–ISSUES INVOLVED AND INTEREST GROUPS IN CONFLICT

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Dr. Mamer should be commended for presenting a concise summary of current thinking on a complex issue affecting the welfare of Americans in general and American farmers in particular. Limitations of time and space have compelled him to focus his attention on limited aspects of the program. Although acknowledging that the social and political consequences of the foreign farm worker program may be as important as, or more important than, the economic issues, he chose to concentrate on economic issues and interest groups involved. In the process, he may have ignored the more important reasons for continuing the program.

I shall limit my remarks to two areas; a re-examination of the impact of the importation of foreign labor on wages and an examination of some political aspects that may currently be of over-riding importance. My remarks are confined to the importation of Mexican Nationals.

As previously pointed out, the recruitment of foreign farm workers under Public Law 78 would cease if the Secretary of Labor failed to certify that "the employment of such workers will not adversely affect the wages and working conditions of domestic agricultural workers similarly employed." This provision serves to focus the controversy on the wage impact issue.

The arguments supporting the contention that domestic wages are not lowered by the importation of foreign labor seem to rest on the assumption that labor is a sharply differentiated input, that the supply of this input is limited and that an increase in wages would not increase the supply of labor. Also implicit in the argument is the assumption that the products produced by these differentiated inputs are differentiated products that they cannot be replaced by products made by a different type of labor. Furthermore, the welfare of our nation would suffer if the volume

of these products currently produced under the imported labor program were cut off in the future.

There is little evidence to support the differentiated input contention; there is even less to support the differentiated product contention. If there is marginal substitution between the various categories of labor and between the products produced by different categories of labor, it is difficult to conclude that a program which increases the supply of labor at a price below that required to induce domestic laborers to perform the same task does not have a depressing effect on wages.

My second point takes me into the realm of the political. I do not see how this can be avoided if the objective is to analyse the impact of a program which by its very nature is political. The program involves negotiations between representatives of the people in 2 sovereign countries. It required the endorsement of both countries for its inception and is continued only by mutual consent.

In retrospect, the mutual advantages of Public Law 78 at its inception are quite clear. Mexico was a country with a large reserve of unemployed or underemployed human resources. The United States was engaged in a global war facing the critical problem of mustering the human resources required to produce the instruments of war as well as food and fiber for ourselves and our allies. A labor exchange program provided employment and foreign exchange for a depressed economy. The capacity of the United States to produce was also increased by the program. In the 19 years that followed conditions changed in both countries.

Attempts to appraise the impact of Public Law 78 on the economy of Mexico have been inconclusive. The favorable effect on the foreign exchange balance is often cited as is the cultural value of an exchange program. However, an alternative to shipping labor to the United States might be to ship Mexican products embodying this labor. It is difficult to accurately compare these alternatives.

Mexico seems to have taken a compromise position. There has been no action to terminate the program, nor to establish it on a permanent basis.

Although the number of workers brought into the United States has increased, so has the controversy engendered each time the law comes up for extension or modification. I should like to argue that there are strong reasons for continuing the program even though doing so partially offsets the effects of other measures designed to combat low returns to the human resource in U.S. agriculture.

First, it is not clear that a program to isolate American farm laborers from the competition of foreign labor is the most efficient means of enhancing their welfare. Their interests might be better protected by public

programs to prepare and assist in integrating them into the higher wage industrial sectors of the economy.

Secondly, Mexico is the Latin-American country that borders the United States. Measures taken by the United States which may be favorable or unfavorable to Mexico, are often interpreted by other Latin American countries to reflect United States policy toward Latin America.[1] Present world conditions make favorable United States-Latin American relations imperative. Under such conditions it seems likely that the program will be terminated when and if Mexico desires. If the United States were to take the initiative in terminating it, the cost could be greater than continuing a plan that is obviously inconsistent with domestic agricultural programs.

[1] For a further development of this point see Elac ,John C., *The Employment of Mexican Workers in U. S. Agriculture, 1900-1960; "A Benational Economic Analysis,"* Ph.D. dissertation, Univ. of Calif., Los Angeles, Calif.

CONTRIBUTED PAPERS: LAND ECONOMICS, FARM FINANCE, AND INSTITUTIONAL ECONOMICS

CHAIRMAN: CHARLES W. LOOMER, UNIVERSITY OF WISCONSIN

THE PREFERENTIAL ASSESSMENT OF FARMLAND, THE MARYLAND EXPERIENCE

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THE 1960 Census of Population reveals, among other things, the extent to which America has become a nation of suburbanites. The spacious living characteristic of suburbia has been achieved at the cost of millions of acres that were previously open country. Apart from the direct consequences of conversion of open land to residential, commercial, or industrial uses—the loss of productive capacity in agricultural and the disappearance of fields, woods, and wildlife from areas around growing cities—other economic effects extend over larger areas. One important effect is the rising property tax.

Many devices have been suggested to alleviate some of the problems arising from heavy taxation of land in agriculture and other low-intensity uses. The legislatures of at least 11 States have considered bills to require assessment of farmland on the basis of agricultural use alone.

In 1956, Maryland, recognizing the growing concern over the prospects of maintaining agriculture in the State, enacted a law requiring that

> . . . Lands which are actively devoted to farm or agricultural use will be assessed on the basis of such use, and shall not be assessed as if subdivided or any other basis.

In 1960, the law was declared unconstitutional. Later in the year, the voters approved an amendment making the law part of the Constitution of Maryland.

The Department of Agriculture has recently undertaken a study of the effects of a law of this type in Maryland. In the 5-county area studied, the effects on individual property assessments were found to vary widely. The effect of the law on assessed values per acre was negligible in the more rural portions of the study area. But in some areas nearest urban centers, assessments were held to amounts as little as one-fifteenth of the assessment that would have been obtained if based on estimated market value.

The reduction in assessed value per acre resulting from the operation of the law averaged about 53 percent for qualifying farms in the 5-

county area. The greatest reduction was in Prince Georges County, where assessments per acre of farmland were reduced on the average by about 65 percent. Carroll County, the most agricultural county of any studied and the least affected by urban growth, showed an average reduction of about a third.

The problem of defining agricultural use has proved to be most troublesome in the administration of the law. Despite efforts of the State Tax Commission to lay down guidelines for assessors to follow, much uncertainty has remained as to what properties are eligible for preferential treatment on the basis of agricultural use and what properties are not eligible.

Closely related to the problem of defining agricultural use is that of determining agricultural value. Since market prices no longer provide a reference point for farmland assessments in areas close to cities, greater weight must be placed on other methods. The variety of methods used in arriving at agricultural value is indicative of the complexity of a problem that will probably become more intricate as time passes, urbanization expands, and sales of land that reflect only "agricultural" consideration become more and more rare.

Preferential assessment of farmland as under Maryland law, involves an explicit departure from the general rule of property taxation—that property be assessed and taxed according to its market value. Departures from the ad valorem basis for assessment are not unknown in property taxation. Standing timber and mineral deposits, for example, have long been recognized as two forms of property to which market value assessment could be applied only with undesirable effects.

Nevertheless, the general rule remains that property should be assessed according to its market value, and the burden of proof rests on him who argues for a departure.

In summary, the problems of defining agricultural use and value make administration difficult. The effectiveness of this measure in preserving open spaces (one of the advantages postulated in the law) is still to be determined.

EFFECT OF NONFARM EMPLOYMENT ON AGRICULTURAL DEVELOPMENT

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AT SEVERAL levels, there is concern about the agricultural future of areas in which there is a large withdrawal of workers from agriculture into better paying, nonfarm employment.

A prevalent economic view is that a removal of excess labor and management will permit a higher return to the human factor remaining. Briefly, labor will flow out and the remaining resources will recombine until returns to the human factor in the area equal those for comparable human resources outside the area. In the abstract form, this theory is logically correct. Unfortunately, it is sometimes used to prescribe a remedy for the low-income problem—simply convince farmers that there are too many people in agriculture.

To render this simplified theory useful in problem solution, it is necessary to examine its assumptions. The specifying of assumptions is a recognized (though often neglected) part of theory development. The examination of assumptions and their use in raising questions to be tested by data is a means of increasing our understanding of how things are operating relative to what we might expect. This, in turn, may enable us to make changes at points which cause results to come closer to those desired.

Only the major necessary assumptions will be listed here. Qualifications relating the assumptions to reality and which suggest hypotheses for investigation are omitted entirely. The major assumptions include the following: (1) There is a significant net reduction of persons employed in agriculture. (2) Farm labor is homogeneous; outmovement does not reduce the quality of the farm labor force. (3) Nonfarm employment effects only the demand for farm labor; the demand for other factors in agricultural production is not increased. (4) Tenure relationships permit new physical and value ratios between land and labor to develop fluidly. (5) Enterprises and technologies are adapted to fluid recombinations of land and labor. (6) Capital and management are available for the recombination of land and labor. (7) The character and location of land made available permits it to be recombined with labor. (8) Community services are available for new combinations of land and labor.

After consideration of the assumptions of theory plus qualifications relating them to reality, we can state the conditions that appear to be necessary if labor removal is to improve income in farming. These conditions might be used to narrow the scope of research relative to the effect

of nonfarm employment on rural development. The more important of such conditions are as follows: (1) Unless there is a *net* reduction of labor in agriculture, there will be no gain in the labor income of farmers. (2) Unless the price of labor rises more than the price of land, there will be no gain in labor income. (3) Unless land has a physical potential for recombination, there will be no gain to small owner-operators and but little to renters. These two groups tend to be the principal low-income workers on poor-to-fair land. (4) If land is fertile and easily worked, farms tend to be large; and the very low-income workers tend to be farm laborers and croppers. Their numbers will be reduced by nonfarm employment relatively more than the number of owners, who will not have their incomes raised. The net gain in terms of the prosperity of agriculture will be small. (5) Only in areas of fair-to-good land with owner-operator farmers without competing nonfarm demands for land is removal of farm labor likely to improve agricultural prosperity. Even here, significant income improvement could be blocked by conditions such as these:

A. A strong impulse for farm enlargement relative to the amount of land freed;

B. The failure of credit institutions to supply more and different credit;

C. A lack of enterprises or technologies adapted to new combinations of land and labor; and

D. The failure of community services to meet the changing situation.

DOES THE FARM-RANCH CORPORATION SOLVE OR CIRCUMVENT PROBLEMS?

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THERE are pros and cons, enthusiasm and warnings, but an optimistic framework has been developed around the advantages of incorporating the farm-ranch business. Four questions are developed from information obtained from a stratified, random sample of Oregon corporations engaged in agriculture, most of which were closely held family corporations.

Are taxes the master of farm-ranch business decision? Although it is the right of every taxpayer to organize his business affairs to save taxes, it does not appear to be the intent of legislators that tax saving should be done through a series of complicated legal and technical procedures requiring the services of specialized and costly tax attorneys and accountants. The corporation is being used as a device to attempt to save taxes,

this being the most important reason given as to why farmers incorporated. Yet, corporate officers know very little about their tax matters, and almost all have given over their tax matters entirely to attorneys or accountants.

The effectiveness of the corporation is its simplicity in dividing and transferring ownership of an economic unit without physical division. But corporate simplicity disappears as the corporation with all its accompanying devices becomes a tool to attempt tax saving.

Incorporations have increased greatly since the advent of the "sub chapter S" corporation,[1] but the actual use of "sub chapter S" provisions still appear to be minor, and indirect effects seem to be more important than the direct effects.

Persons advising farmers only can continue to advance the most up-to-date devices of tax saving. Yet through "social invention," the organizational and institutional framework and procedures now in force can be modified to eliminate the need for such methods of tax saving and place the farm-ranch corporation rightfully as a simple form of business ownership and not a device of tax procedure.

Is liability really limited in the farm-ranch corporation? Limited liability has no significant meaning if stockholders have little or no property outside the corporation. This was the case with many stockholders, particularly in family corporations. It was found that in nearly all cases stockholders sign personally for corporation loans, eliminating any limited liability for corporate loans.

Corporate farmers seem to be protecting themselves quite adequately with liability insurance. With this protection, it is questioned if many of the devices of separating property from the corporation for liability reasons are worth the loss of simplicity these separations create.

Is financing and capitalization improved with incorporation? The finance and credit picture of farms has changed little as a result of incorporation. Stock has not been sold to raise equity capital; stockholders have not used debt securities in their capital structure. Loans are still received from the same sources and operators are still personally liable for farm debts. Farm-ranch corporations do not extensively use dividends because most earnings are "plowed back" into the corporation. In addition, many stockholders have made loans to the corporation, indicating that an important part of farm financing is still internal financing. In-

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[1] Also "tax option" corporation. Technical Amendments Act of 1958, Sub ch. S—Election of Certain Small Business Corporations as to Taxable Status. Such election allows a small business corporation to be taxed as a partnership.

corporation did not seem to greatly limit or expand available external credit but did complicate procedures of borrowing. Incorporation has not significantly changed farm peoples attitude toward the use of perpetual debt; most are still opposed to the idea.

Are ownership, transferability, and operational procedure improved with incorporation? Better continuity of operation and management seem to be an important reason for incorporating. This reason has been advanced as a means of giving perpetual life to a farm firm and eliminating cyclical financing. Yet, Oregon incorporation records show a relatively short life span for corporations engaged in agriculture; however, in recent years the life span seems to be lengthening, possibly coinciding with increasing numbers of family farm corporations. Even with the desire for continuity of ownership, adequate planning for transfer of stock has not been made. Certain other tools of the corporation such as voting, ownership trusts, or retirement plans have not been used.

State corporation laws are not written for small closely held corporations, and they sometime create unnecessary complications in business affairs. Much has been written relative to protecting minor stockholders. I advance the idea of needed protection for the major stockholders in family or closely held corporations where stockholders, directors, and officers are all the same persons. Voting control is with stockholders in the election of directors, but a major stockholder may lose control as he becomes one of several required directors each having equal vote. I propose the possibility of State laws allowing small closely held corporations to dispense with directors and let stockholders assume these responsibilities and vote relative to their shares of stock.

In conclusion, the corporation in its simplicity has a useful and important place in farm-ranch financial planning and management, but it has limitations. Potential use is much greater than present application. The corporation is also being used for purposes which may be currently expedient, but which could be accomplished better by other means; tax saving is an example. "Social invention" in the area of taxes, liability, financial procedures, and corporate law is needed to make the corporation a still more useful tool of farm ownership, operation, and transfer.

ECONOMIES OF SCALE IN AGRICULTURAL PRODUCTION

CHAIRMAN: GEORGE T. BLANCH, UTAH STATE UNIVERSITY

ECONOMIES OF SCALE IN CROP PRODUCTION*

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THE average size of the farm firm and the number of larger size farms have been increasing rapidly in recent years in most areas of the United States.[1] One reason advanced for the increasing number of large-size farms is that larger farm operators are able to gain some per unit cost or price advantage.[2] To ascertain if there are certain economies accruing to the large-size farms, it is necessary to first consider the means by which economies can be obtained. The next step is to specify the magnitude of the economies. For the latter step, the technique or method of analysis is extremely important. Some techniques will result in more precise estimates than others. This paper is primarily concerned in identifying the types of economies that might arise and in evaluating techniques that can be used to obtain an estimate of the magnitudes.

Types of economies that may be encountered in crop farming are classified as (1) those arising from technical relationships, (2) in the acquisition of inputs, and (3) arising from vertical integration of the farming operation.

Economies Arising from Technical Relationships

The technical or physical relationships arising from mechanization are a major factor in reduction of per unit costs on larger crop farms. Several recent studies indicated that per unit cost of producing a specified product (cropping program) decreased substantially as farm size increased from the small-size to the medium-size farm.[3] However, the per

* Giannini Foundation Paper No. 213.

[1] The preliminary report of the 1959 Agr. Census indicates that the average size of farms in the U. S. increased to 302.4 acres in 1959 from 242.2 acres in 1954, a 25 percent increase. In the last 10 years the number of farms 500 acres or over increased approximately 12 percent.

[2] Farm size is a relative measure. A medium-size farm will be referred to as a farm that approximates the average acreage of a type of commercial farm in an area. A small-size farm will be referred to as a farm that contains one-half or less the number of acres of the medium-size farm, while the large-size farm will have two or more times as many acres as the medium-size farm.

[3] For example, see: Heady, E. O., McKee, Dean, and Heady, C. B., *Farm Size Adjustments in Iowa and Cost Economics in Production for Farms of Different Sizes,* Iowa Agr. Expt. Sta. Res. Bul. 428, May 1955; Dean, Gerald W. and Carter, Harold O., *Cost-Size Relationship for Cash Crop Farms in Yolo County, Calif.,* Calif. Agr. Expt. Sta. Giannini Mimeo Report. No. 238, Dec. 1960.

unit cost of production decreased relatively little after the medium-size farm was attained. Thus, the long-run average cost curves tended to "flatten out" beyond the acreages (or output) specified for the medium-size farms. The reduction in the per unit costs of output was primarily a result of lower equipment (and labor associated with the equipment) costs per acre.

The reduction in per unit costs resulting from technical economies decreases up to the point where the larger and more expensive pieces of equipment are more or less full utilized. This point is usually attained by the medium-size farms. Beyond this point, the equipment component for large-size farms is more or less multiples of the equipment component for the medium-size farms. It appears from the above, that as certain segments of agriculture become more mechanized (and if the cost of this equipment is quite large) that the acreage of the medium-size farms will increase in the future.

In the determination of the technical economies associated with size of crop farms, it is extremely important that the equipment component be carefully selected for each size of farm. The long-run average cost curve or the economies of scale curve, represents the least cost combination of inputs for each level of output given the existing level of technology. Although other inputs are important in determining the level of this curve, the shape or slope of the curve (with respect to technical economies) is primarily determined by the equipment component and labor associated with the equipment.

There are two major methods of obtaining information upon which to base the equipment components. These are (1) the random stratified sampling survey method and (2) the economic-engineering synthesis method. The two methods do not need to be mutually exclusive.

The first approximation of the equipment component, using the random stratified sampling method, will usually be obtained by a model grouping (or simple average) of the equipment on farms in each size group. This data plus the judgement of the researcher will determine the final equipment component. Standards of performance rates for various pieces of equipment can be used by the researcher as an aid to his judgment. The random stratified sample survey method is not a satisfactory method of obtaining adequate information to specify a least cost equipment component. Although the farms in the sample may be rather homogeneous with respect to crops produced and physical characteristics such as soil and climate, they are not homogeneous with respect to many other important attributes. The equipment component on many of the sample farms may be ill suited to the current farm operation. Recent changes or anticipated changes in acreage farmed or crops produced and mis-

matched power units and implements are several of the reasons why the present equipment component on crop farms do not approximate the least cost combination for that size of farm. Another reason for the deviation of the equipment component on the sample farms from the least cost combination, is that many farm operations have much more equipment than is necessary to actually operate their farm. Dean and Carter found in their study that many farmers had machinery capacity far in excess of that required as a "reasonable protection against unfavorable weather."[4]

The economic-engineering synthesis approach is basically a synthetic means of assembling input-output information. For the equipment and labor inputs, heavy reliance is placed on engineering studies, e.g., time studies work sample studies and data provided by equipment companies, to develop physical standards of performance. The physical standards for the other input-output relationships are based upon current research in other technical disciplines. The economic-engineering approach has been used in a number of economies of scale studies of processing plant operations.[5] Although the technique of synthesis is old in the area of farm management the use of the economic-engineering synthesis technique has been limited in this area.[6]

In the determination of the economies of scale curve, the equipment component will probably be the "fixed plant" for the short-run average cost curves. However, it does not appear logical to *a priori* select an equipment component and then determine the per unit cost of output which results.[7] An equipment component selected *a priori* may not be the least cost combination at *any* level of output. The correct procedure is to select an output (or a number of outputs) and determine the equipment component(s) that will result in the least cost for that output. After the equipment component has been selected in this manner, it then becomes the "fixed plant."

The procedure used in the economic-engineering synthesis approach and the type of data required are briefly discussed below. First, the operations (stages of production) to be used in producing the crops are specified. Then the time limitations within which certain operations must

[4] Dean, Gerald W. and Carter, Harold O. *Ibid.*

[5] For example, see: French, B. C., Sammet, L. L., and Bressler, R. G., "Economic Efficiency in Plant Operations with Special Reference to the Marketing of California Pears," *Hilgardia*, Berkeley: Vol. 24, No. 19, July 1956.

[6] Fellows, I. F., Frick, G. E., and Weeks, S. B., *Production Efficiency on New England Dairy Farm 2. Economics in Dairying—An Exploration in Farm Management Methodology*, Conn. Agr. Expt. Sta. Bul. 285, Feb. 1952. The synthesis approach is used in this investigation but labor is assumed to be the restricting factor.

[7] Heady, E. O., McKee, Dean, and Haver, C. B., *op. cit.* An equipment component was selected *a priori* in this investigation.

be performed in order to obtain specified yields are determined.[8] The physical standards of performance must then be obtained for the various types and sizes of equipment that can be used to perform each operation. Although the farm worker actually works 12 hours in a day, only 10 hours may have been spent on a tractor discing or plowing. Thus, good estimates of "down" time, travel to and from the field, lubrication time, etc., are necessary. After determining the physical standards of performance, the inputs must be costed.[9] Some of the difficulties in costing inputs cannot be discussed here because of the space limitation.[10]

In addition to the above, alternatives other than sole ownership of equipment, need to be investigated. Possible alternatives are renting equipment, joint-ownership, reciprocal borrowing, and having some of the operations performed on a custom or contract basis. It is also necessary to take into consideration the quantity, quality, cost, and availability of labor required to perform the necessary farming operations.[11] After having specified the constraints and physical and cost relationships for the inputs, a least cost equipment combination can be selected. Questions as, "should the farm operator use a 10½, 12, or 15 foot disc with a 50 drawbar H.P. tracklayer" or "should two 50 drawbar H.P. tracklayers or one 100 drawbar H.P. tracklayer be used" arise. The former question can be answered for the discing operation (stage of production) independent of the other operations. The answer to the latter question is dependent upon a number of operations if the tracklayers are used for more than one operation. The least cost power component for discing may not be the least cost power component for plowing, subsoiling, etc. Thus for equipment used in more than one operation, the least cost piece of equipment is based upon the composite of the operations in which it is used. Budgeting and perhaps linear programming can be used as a technique to select these pieces of equipment.

Although the economic-engineering synthesis approach has a decided advantage over the random stratified sample survey approach in specifying the least cost equipment component, the time and cost expended in the former approach, at first, will probably be far in excess of that of the latter. However, once the basic information on equipment performance rates has been obtained in one area, it will be useful in others.

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[8] *Ibid.* The reductions in yield due to untimeliness in field operations were taken into account in this investigation. It could be assumed that the farm operator would not normally operate in the area where the per acre yields would be reduced.

[9] The problem of costing inputs as related to size of farm is discussed in a later section of this paper.

[10] French, B. C., Sammet, L. L., and Bressler, R. G., *op. cit.* A rather complete discussion on costs is presented in this article.

[11] Fellows, I. F., Frick, G. E., and Weeks, S. B., *op. cit.* Labor is assumed to be the restricting factor in this study.

Thus the residual effect of the basic information is considerably greater for the economic-engineering synthesis method than for the random stratified sample survey method. As technical relationships or technologies change in some of the operations, it is relatively simple to insert these changes into the total farm operation to determine the effect of these changes on size when the economic-engineering synthesis approach is used. In addition, the economic-engineering synthesis approach indicates what can be done in the farming operation while the random stratified sample survey method indicates what is being done.

An estimate of the change in per unit costs as a result of increasing output could be similar for each of the methods. This would occur if the shapes and slopes of the long-run average cost curves are approximately the same, even if one curve is considerably higher than the other curve. In this instance, the advantage of the economic-engineering synthesis approach would be considerably lessened. Whether or not these curves might have approximately the same slope and shape is a matter of conjecture at this time.

The data obtained by the random survey method lends itself to being analyzed by the regression technique. This appears to be a doubtful advantage as the estimates obtained from regression analysis are no better than the data used. The aggregation of data obtained from a random survey into a few variables for the purpose of estimating the economies of scale results in estimates that are difficult to interpret and use.

Economies in the Acquisition of Inputs

An important area in which economies might accrue to the larger farm operators is in the acquisition of inputs. Generally, economists have only paid "lip service" to the possibility that there might be cost advantages accruing to the larger farm operators in the acquisition of inputs. A comprehensive investigation of the factor markets (the markets within which farm operators purchase inputs) has not been made to the best knowledge of the author. Unfortunately, little empirical data are presently available except in general terms to indicate the relationship between cost of inputs and farm size.[12]

Factor markets might be classified as factor markets for (1) annual physical inputs, (2) equipment, (3) credit, and (4) custom or contract work.[13] Preliminary evidence in an investigation being conducted in Kern

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[12] Armstrong, David L. and the author are currently studying the economies of scale associated with size of the farm firm for crop farms in Kern County, Calif. The relationship between economies in the acquisition of inputs and farm size is being investigated.

[13] The factor market for labor is not considered although it may be important.

County, Calif., indicates that operators of larger farms are apt to have a cost advantage over the small farm operators in each of these factor markets.[14] For example, quantity discounts are generally available on the purchase of a number of annual inputs such as fertilizer, insecticides, and fungicides. Additional services are being performed for many large operators by local dealers. Also, there appears to be a definite relationship between the size of the loan (and the size of farm) and the rate of interest charged by banks; although there are a number of other important considerations determining the rate of interest. Preferential treatment to the larger users of the services of those furnishing custom or contract services, can reduce the cost per unit of output. Quantification of some of these relationships is extremely difficult.

Although the above discussion indicates that operators of large farm units may be obtaining cost advantages in acquiring inputs, the same opportunities are at least in part available to operators of smaller farm units. Purchasing cooperatives or two or more farm operators acting jointly can obtain these inputs for approximately the same price as large farm operators. Agencies, such as the Production Credit Associations, tend to offset some of the apparent advantages of the large farms in obtaining financing.

Information necessary to specify the magnitude of the economies, if any, obtained by large farm operators in the acquisition of inputs is difficult to obtain. Suppliers of the inputs can furnish some of this information. However, a sample of farm operators would probably be needed as a source of additional data and as a check on the reliability of the information obtained from the suppliers.

Economies Arising From Integration

A farm operator has an opportunity to engage in the processing and marketing of some crops. Do the large-size farm operators have an advantage over the medium-size or small-size farming units in integrating the production, processing, and marketing processes of these crops? Observations in Kern County indicate that generally the large-size potato farmers operate their own potato processing sheds while the small- and medium-size potato producers do not. Ownership of a processing shed usually carries the advantage of obtaining other inputs at dealers' prices and this may enable the farm operator to increase his revenue. The owner processes his own potatoes first to take advantage of higher prices at the first of the season. Ownership also enables the farm operator to have good control over the quality of the product.

If farm operators can raise their revenue function by owning process-

[14] Armstrong, David L. and the author, *op. cit.*

ing facilities and if this is a function of size, then integration should be included as an economy associated with size.[15] Again, as in the acquisition of inputs, joint action by smaller operators can reduce or eliminate the advantage obtained by the large-farm operators.

Uncertainty has been advanced as one of the reasons why many farm operators do not expand the size of their operations. Integration may tend to decrease uncertainty with respect to income. Even in the years when

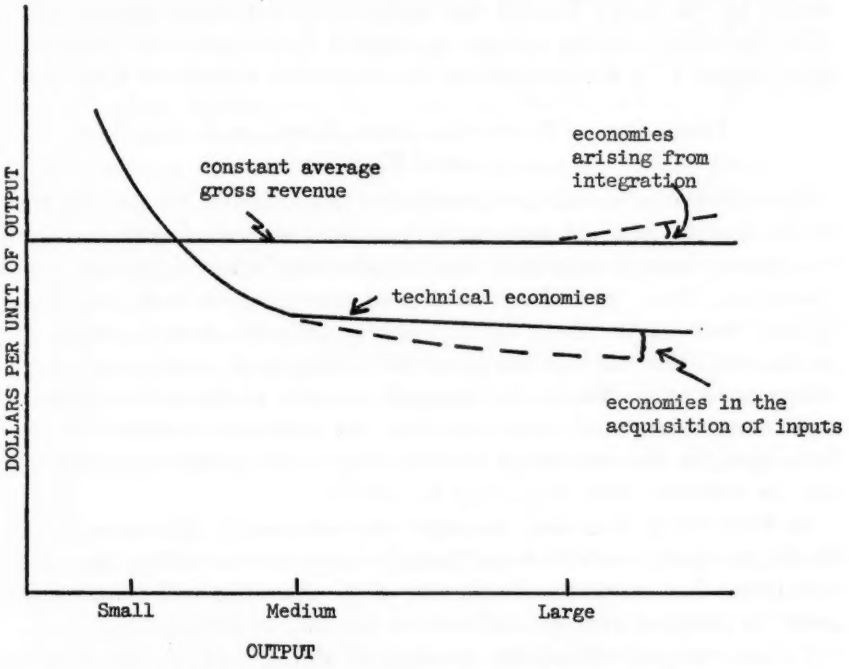

FIGURE 1. POSSIBLE ECONOMIES ASSOCIATED WITH SIZE.

commodities such as vegetables or fruit are "unprofitable" enterprises, the processing and marketing can be "profitable" operations. This may be especially the case in the years when the price of the commodity is low because of a large crop.

Summary of Possible Economies Associated With Size

Figure 1 has been hypothetically constructed to indicate the major types of economies and the relevant relationships that might exist as

[15] It can be argued quite effectively that the processing operation should not be included in the economies of scale curve. This point is not being argued. Rather the point being made is that the processing operation may be an economy *associated with* size.

the farm operation increases in size. The AC curve labeled "technical economies" decreases very little after the medium-sized farm is attained. Economies in the acquisition of inputs are assumed to reduce the per unit costs, however, as the farm size is increased beyond the medium-size farm. Thus, the average cost per unit of output is actually denoted by the AC′ curve rather than the curve labeled AC. Economies arising from integration, if any, are likewise assumed to accrue to the larger farming operations. Thus, the average revenue curve would be represented by the curve labeled AR′ rather than the curve labeled AR. A curve indicating the net revenue per unit of output could be constructed from Figure 1. It would indicate the *economics associated with size.*

Limitations of Recommendations Based on Economies Associated With Size

This discussion would be incomplete without briefly mentioning some of the limitations of an analysis of economies associated with size. Non-contiguous farming units may have a substantial effect upon the cost of operations. Thus, expanding the size of the operation with a non-contiguous unit might result in an entirely different cost function. The product mix may vary as the farm size increases or is increased. In the cotton areas of California, for example, the size of the cotton allotment is inversely correlated with farm size. As farm size is increased by a farm operator the percentage of each crop in the product mix may vary and, in addition, new crops may be added.

As farm size is increased, management may not be able to cope with the larger operation. This is particularly important in making the recommendation that an increase in the size of the operation will automatically result in a higher average net revenue per unit of output.

Factors such as uncertainty, managerial ability, and the tax structure may be much more important in determining whether or not a farm operator should increase the size of his farming operation than economies associated with size.

DISCUSSION: ECONOMIES OF SCALE IN CROP PRODUCTION

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Faris has presented an interesting and challenging paper on a broad and well confused problem. I am in agreement with what he has said, but somewhat at odds on his omissions. However, covering such a large subject as adequately as he has, in the time allotted, is in itself a real accomplishment.

He has spelled out the means by which economies can possibly be attributed to scale, and he has discussed some techniques for measuring the magnitudes of these economies.

Nowhere in the paper, however, does Faris define the way in which he uses the terms "scale" and "size." He seems to be using the two as synonyms. I have also used them interchangeably in my discussion.

Faris advances the thought that one of the reasons for the increasing number of large-sized farms is that the large farm is able to gain unit cost or price advantages not available to the smaller farm. This is no doubt true but I wonder if more basic in the farmer's decision-making is the need for greater volume in his production if he is to increase his total net return significantly. Any unit cost benefits arising from the increase in volume are gratefully accepted.

Before we can adequately measure the economies, or diseconomies of size in crop production we need a more rigorous and workable definition. Scale in cropping is quite commonly measured in terms of acres. They are a reasonably good measure for comparative purposes in a given period and for a homogeneous type of farming only.

Economies presumably accrue to size from mechanization which results in lower unit fixed costs. We also get lower unit fixed cost by increasing yield per acre. This, some would say, is also a way of increasing size. In any case, increased yield per acre has probably been a far more effective method of lowering unit cost than has increased size (acres).

Faris points out that most of the unit cost economies of mechanization have been milked once medium size has been attained. Zuroske, of Washington State, in some apple work, found no economies accruing to size. In fact, costs per acre increased as number of acres increased. Whether this is true of all apple areas or is unique to the Washington study area I don't know, but it does suggest the possibility of diseconomies connected to size.

I agree with Faris that random survey techniques do not give us the refined coefficients we need when determining the machinery component. However, I am also skeptical of coefficients developed solely through economic engineering techniques. Faris suggests that the two techniques need not be mutually exclusive. I would say that they must not be mutually exclusive if we are to have the best coefficients possible. There are advantages to both methods that I believe will prove useful if tempered with a liberal amount of researcher judgment.

One of the real advantages that I see in the economic engineering approach is that management can be handled as a constant while studying the effects of size changes as such. Unless the management factor

can be held at some constant level I can see no way of truly determining the effects of size.

Faris states that "The random survey method lends itself to being analyzed by the regression technique. This appears to be a doubtful advantage as the estimates obtained from regression analysis are no better than the data used." This statement could well be expanded to include the results from all types of analysis. No method of analysis that I know of can plug in poor data and come up with good answers.

There are cost advantages that accrue to volume through additional bargaining power. Merely the fact that a grower has a large amount of product to sell may give him an advantage that the small operator can hope to achieve only through his coop.

I wonder if many of the economies of factor acquisition that Faris attributes to size should be credited to higher quality management. The man who operates the large farm is probably a far more aggressive individual than his medium-sized or small-sized counterpart. I do know that discounts are available to the small-sized operator if he goes after them. Given our competitive system, logic alone tells us some of these quantity discounts should exist up to some level. However, logic also suggests that a maximum discount is probably obtained not too far beyond the medium-sized operation. Even coops give some quantity discounts on annual inputs such as fertilizer, fuel, and insecticides.

At one time most of our farms that produced perishables were vertically integrated. The vegetable and fruit grower did their own processing and peddling. This was one way they had of increasing their size of business. I still wonder if vertical integration is not a way of increasing size of business. I am skeptical of economies of integration accruing to size. It may be for certain crops a reasonably good way to insure against uncertainty, but perhaps the same thing can be accomplished by changing the enterprise mix.

I made the statement in the beginning of this discussion that economies of scale are a confused problem area. I have no reason to change my opinion. I suspect the economies that can truly be attributed to size are relatively few. Until that time when the agricultural economist can come up with a reasonably good measure of size and of the management factor his success in quantifying the economies accruing to size alone will be limited.

I am in full agreement with Faris' closing statement that "Factors such as uncertainty, managerial ability, and the tax structure may be much more important in determining whether a farm operator should increase the size of his farming operation than economies associated with size."

ECONOMIES OF SCALE IN LIVESTOCK PRODUCTION

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NEW technology, changing relationships of resources, and shifts in population centers are causing many changes in livestock production in the United States. Livestock producers and processors are much concerned relative to the future of particular livestock enterprises in the various regions of the country. The development of large scale cattle feeding enterprises in the Southwest and the West Coast and the resulting competitive position of the corn belt feeder has been the topic of discussion of many meetings of producers, feeders, and others concerned. The milk cow pool idea, leasing of sows and cows, the confinement hog production systems, contract feeding, the feed bank idea, mechanization of feed lots, bulk feed handling, large scale broiler and turkey enterprises, and the increase in beef cow herds in the Middle West and Southeast have been justified as the coming trend in the livestock production by many persons for many reasons. Nearly all of these justifications are based on two general considerations: one, that a particular area has an advantage either in costs or markets over another; or two, the large scale enterprises have a cost advantage and resulting higher profits or a combination of the two.

Many enthusiasts go so far as to say that all dairying, poultry, hog production, and cattle feeding will soon be disassociated from crop production. They claim that the economies of a large scale enterprise in reducing costs, attracting capital and management, and having market advantages will offset the efficiencies of the complementary and supplementary relationships that exist in the combinations of crop production and livestock production of the modern midwest farm.

It is difficult for one whose entire experience has been related to Corn Belt agriculture and the interrelation of crop and livestock production to believe that the two can be separated. But one needs only to look at the statistics relative to production of dairy products, broilers, eggs, pork and fed cattle in recent years to realize that a larger proportion each year of these products is being produced in businesses that are quite disassociated from crop production by the same manager. In fact, in the heart of the corn belt one finds an increasing number of large specialized livestock enterprises that are completely independent of the crop production of any of the adjacent land.

There are many gaps in the data needed to carefully analyze the economies of scale in livestock production. Some of this is due to failure of research workers to work on the problem, but there are also many areas

that can only be speculated on. For example, when the size of enterprise is increased how can the greater risk and the increased management requirements be reflected in the analysis? These may not be serious when studying trends in general, but they are of real consequence when the individual manager attempts to analyze his gain from increasing the size of enterprise.

Other papers are dealing with the economies of scale in crop production as well as the possible adjustments in agriculture in total in view of scale economies. I will thus confine my discussion to livestock enterprises with only related comments relative to crop production. In addition, I will deal only with cattle feeding, dairy production, and hogs. Estimates of costs of production in these three enterprises were made based on data available from several Midwest States. These estimated costs are shown in tables 1, 2, and 3. Feed costs are based on $1 per bushel for corn.

Table 1 shows the estimated costs of cattle feeding by size of enterprise ranging from 25 to 250 head. Steer calves are purchased in the fall, fed under deferred feeding programs, putting on 625 pounds of gain over a 12- to 14-months period. In this analysis it is assumed that there is management skill available to handle efficiently a 250-head enterprise with modern equipment. There is no reflection of increase in management requirement or risk involved as the enterprise is increased in size. Thus, it is assumed that feed costs, medical and death loss costs, insurance and taxes, capital for feed and livestock, and building costs are the same per head regardless of size. Some would question the building charge remaining the same regardless of size of enterprise. But in an enterprise that takes no more building facilities than cattle feeding the cost of housing is in direct proportion to the size of the enterprise if the system of feeding is the same.

The equipment and power costs and direct labor costs are based on the type of equipment that we find in feed lot operations of the various sizes. The 25-head enterprise is largely a scoop shovel and wagon operation in handling the feed while the larger scale enterprises have the auger wagon with fence-line bunks and the use of self feeders. The equipment and power costs decline from $13.50 per head to $9.94 per head as the size of the enterprise is increased from 25 to 75 head, or a drop of $2.56 per head. From 75 to 250 head, the decline is from $9.94 to $8.66 per head, a reduction per head in power and equipment costs of only $1.28. Labor costs declined $4.32 per head from the 25-head enterprise to the 75-head enterprise and only dropped $1.94 per head further as the enterprise was increased to 250. Combining the two items of power and equipment costs and labor, the cost per head declines in total from $27.26 for the 25-head enterprise to $19.38 for the 75-head

enterprise, a drop of approximately $8.00. As the enterprise increases from the 75-head unit to the 250-head unit there is a further decrease in cost to $16.16, or a drop of a little over $3.00 per head. These reductions in cost represent the decrease cost per unit as the basic equipment is more fully utilized and indicate that most of the reduction is achieved as the enterprise is increased from 25 to 75 head.

TABLE 1. ESTIMATED COST OF CATTLE FEEDING BY SIZE OF ENTERPRISE.
(Steer calves—deferred feeding—625 lbs. gain)

	Number of Head				
	25	50	75	125	250
Costs per head					
Feed	$ 91.80	$ 91.80	$ 91.80	$ 91.80	$ 91.80
Veterinary and death loss	6.62	6.62	6.62	6.62	6.62
Insurance and taxes	1.00	1.00	1.00	1.00	1.00
Capital (feed and livestock) (6%)	7.80	7.80	7.80	7.80	7.80
Buildings	6.35	6.35	6.35	6.35	6.35
Total	$113.57	$113.57	$113.57	$113.57	$113.57
Equipment and power cost	$ 13.50	$ 11.95	$ 9.94	$ 9.49	$ 8.66
Direct labor ($1.25 per hr.)	13.76	10.45	9.44	8.71	7.50
Total	$ 27.26	$ 22.40	$ 19.38	$ 18.20	$ 16.16
Total cost per head	$140.83	$135.95	$132.95	$131.77	$129.73
Cost per 100 lbs. of beef produced	$ 22.53	$ 21.75	$ 21.27	$ 21.08	$ 20.76
Total capital per enterprise	$ 6,250	$12,100	$17,550	$29,125	$57,250

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But of real significance in the cattle feeding enterprise is the fact that these savings in labor and power and equipment costs are a relatively small proportion of the total cost in the production as size is increased. Costs per 100 pounds of beef produced are reduced from $21.27 for the 75-head unit to $20.76 per 100 pounds in the 250-head unit. When one looks at these cost relationships and the increased risks that are involved in an enterprise of 250 head of cattle, which takes about $60,000 in capital as compared with a 75-head enterprise, which takes about $17,000 of capital, plus the increased management requirements, there appears

TABLE 2. ESTIMATED COST OF PORK PRODUCTION BY SIZE OF ENTERPRISE.
(Two-litter system, centralized housing, size of enterprise expanded by increasing multiple farrowing and expanding facilities.)

	Two-litter system	Four-litter system	Six-litter system	Eight-litter system	Twelve-litter system
Number of litters annually	48	96	146	192	288
Cost per litter					
Feed	$145	$145	$145	$145	$145
Power and fuel	10	10	10	10	10
Medical, breeding and other	11	11	11	11	11
Capital (feed and livestock) (6%)	6	6	6	6	6
	$172	$172	$172	$172	$172
Housing cost	$ 19	$ 15	$ 12	$ 11	$ 10
Materials and handling equipment	12	6	4	3	2
	$ 31	$ 21	$ 16	$ 14	$ 12
Labor ($1.25 per hour)	$ 19	$ 19	$ 19	$ 19	$ 19
Total cost per litter	$222	$212	$207	$205	$203
Cost per 100 lbs. of pork	$13.53	$12.93	$12.62	$12.50	$12.38

SOURCES OF DATA:
Suggested Costs and Returns for Use with Budgeting Procedure, Coop. Ext. Serv., Iowa State Univ. FM-1186, Sept. 1960.
Bauman, R. H., *Comparative Costs of Portable and Permanent Structure in Swine Production and the Effect of Intensity of Use on Costs*, Coop. Ext. Serv., Purdue Univ. Mimeo EC-149, July 1957.

to be in reality little economy of scale in cattle feeding enterprise beyond a 75-head unit, assuming other opportunities are available for the use of capital and management.

In addition, when one looks at the cattle feeding enterprise that is part of a farm business which includes feed grain production, the larger the enterprise the smaller the role unmarketable and complementary roughages play in the feed supply. Thus we may find increasing feed costs as the enterprise increases in size.

Table 2 shows the estimated cost of pork production by size of enterprise. In this analysis the 2-litter system with a centralized farrowing house for 24 litters and the additional growing and fattening equipment and facilities needed to handle the enterprise are examined in the framework of increasing the multiple farrowing operation. The size of enterprise is increased from the 2-litter system of 48 litters by more intensive use of the farrowing house, ranging from the 2-litter system with 48 litters annually to 288-litter system which would have a unit of 24 sows farrowing each month. Again, as in the cattle feeding enterprise, there is adequate skill to successfully manage the large enterprise of 288 litters. Under these assumptions there would be no differences in feed, power and fuel, medical and breeding costs, and capital for livestock and feed

as the enterprise is increased in size. Several studies of hog enterprises indicate that there is little, if any, reduction in the direct labor requirements when the size of enterprise is expanded beyond 40 litters of pigs. In view of this a constant charge for labor is made per litter for all sizes of enterprises considered.

Housing costs decline from the 48-litter setup of $19.00 per litter to $10.00 per litter in the 288-litter setup, with the major reduction in housing occurring between the 48-litter and the 146-litter setup or between the 2-litter farrowing system and the 6-litter farrowing system. At this point the complete array of farrowing house, nursery, growing, and fattening facilities are nearly fully utilized on a year-round basis.

Materials and handling equipment including self-feeders, waterers, and all other equipment costs decline sharply, from $12.00 to $6.00 a litter, as the hog enterprise is increased from the 2-litter system to the 4-litter system, giving practically full utilization of the equipment necessary to efficiently handle the enterprise. Although the cost of this type of equipment does continue to decline as the size of enterprise is further increased, the rate of decline is much slower.

Again we find an enterprise in which the housing, materials and handling equipment, and labor costs are a small proportion of the total cost of production. Although there is considerable reduction in cost per unit as the size of enterprise is increased, its total effect on the cost per hundred pounds of product produced is relatively small once the basic housing and equipment with its flexibility of use is fully used on a year-round basis. Cost per 100 pounds of pork produced decline from $13.53 per hundred with the 2-litter systems to $12.93 with the 4-litter systems, a decline of 4.5 percent. Further expansion of the enterprise to the 12-litter program with 288 litters annually reduces costs per 100 pounds of pork produced by only 55 cents per hundredweight.

In view of the management requirements in disease control, breeding, and marketing that are required in the large scale hog enterprise, advantages over the smaller enterprise from a cost standpoint are small. The potential of the development of such enterprises on a scale that will drive the midwest hog producer out of business seems quite unlikely. This does not, of course, mean that there will not be further development of the large scale hog enterprises as management and capital seek profitable opportunities to specialize.

Table 3 gives the estimated cost of dairy production for four levels of dairy enterprise based on number of cows milked. Production level is 10,000 pounds of milk per cow, with loose housing and bulk handling of milk. Again the assumption is made that there is management available to handle the 120-cow herd as efficiently as the smaller size herds. Thus, feed costs, breeding, veterinary, medical, death losses, cow depreciation,

TABLE 3. ESTIMATED COST OF DAIRY PRODUCTION BY SIZE OF ENTERPRISE.
(10,000 lbs. milk per cow, loose housing, bulk handling of milk.)

	Number of Cows			
	15	30	60	120
Cost per cow				
Feed	$ 141	$ 141	$ 141	$ 141
Breeding, vet., med., death loss	20	20	20	20
Cow depr., int., taxes	56	56	56	56
Total	$ 217	$ 217	$ 217	$ 217
Building and equipment cost	$ 40	$ 50	$ 37	$ 28
Milk handling equipment cost	31	17	11	8
Direct labor ($1.25 per hr.)	150	103	76	76
	$ 221	$ 170	$ 124	$ 112
Total costs per cow	$ 438	$ 387	$ 341	$ 329
Cost per 100 lbs. of milk	$4.38	$3.87	$3.41	$3.29

SOURCES OF DATA

Strain, J. R., Fincham, R. C., Wright, E. O., and Roth, Fred, *Dairy Enterprise Alternative Evaluation Sheet*, Coop. Ext. Serv., Iowa State Univ. M-913 (Rev.), March 1959.

Suggested Costs and Returns for Use with Budgeting Procedure, Coop. Ext. Serv., Iowa State Univ. FM-1186, Sept. 1960.

interest, and taxes would be the same regardless of the size of enterprise. The other costs in the dairy enterprise, including buildings, equipment and labor, are a much greater portion of the total costs than in hog production and cattle feeding because of the need for individual feeding, twice-a-day milking and the handling of the dairy products. Thus, there is greater opportunity for substituting equipment for labor and the more intensive use of equipment and facilities.

Building and equipment costs increase from $40 to $60 per cow as the herd is expanded from 15 to 30 cows with the addition of mechanical feed handling and barn cleaning equipment. This cost drops to $37 per cow with a 60-cow herd and further declines to $28 with a 120-cow herd. Milk handling equipment costs decline from $31 for the 15-cow herd to $17 per cow for the 30-cow herd. There is a further reduction as the cow herd is increased beyond 30 cows but not nearly as much as the cost reduction to 30 from 15 cows. A 30-cow herd gives the opportunity to efficiently use bulk storage equipment but larger herds provide the opportunity to more fully use milking equipment.

Labor makes up a larger proportion of the cost of a dairy enterprise than it does in either the beef or hog enterprise. This, plus the necessary routine work of the dairy enterprise, makes the substitution of equipment for labor a major cost reducing opportunity. For the 15-cow herd direct labor costs amount to $150 per cow and drop to $103 per cow for the 30-cow herd and are reduced to $76 per cow for the 60-cow herd.

The source of data for these estimates on dairy enterprises indicates that there is no further reduction in labor requirements per cow as size is increased from the 60- to the 120-cow herd.

In summarizing the estimates of all costs in dairy production we find a decline of $51 per cow as the size of herd is increased from 15 to 30 head, a further decline of $46 as the herd is increased to 60 head and an additional reduction in cost of $12 per cow as size is increased from 60 to 120 cows. This is a reduction of 22.3 percent in total cost per 100 pounds of milk produced as the size of herd is increased to 60 from 15 cows. Thus, in the dairy enterprise we find a marked reduction in cost per unit of product produced as size of herd is increased, assuming that there is adequate management present. Also, this is an enterprise where other management factors, such as buying and selling and timing of the production, do not play the role that they do in the hog and beef feeding enterprise. In view of these economies of scale we find even in the areas where forages are a complementary crop to grain production, a very marked shift to large scale dairy enterprises and an abandonment of the small dairy enterprise.

This discussion of the economies of scale in livestock production has been largely limited to the labor, equipment, and facilities used on a single enterprise basis. Several other areas should have detailed analyses, such as the scale economies of combinations of livestock enterprises, the economies of related areas such as feed processing and whether the nature of the product produced is the same. In the midwest the combination of high moisture corn, silage, and stilbestrol in cattle feeding has given an economical gain but the weight of the animal to provide a low choice carcass is heavier than the market demands.

The term "specification buying" is becoming more prevalent every day in livestock marketing. Study is needed of: economies possible from large scale operations in more efficiently meeting this development; also, what gains are possible when the enterprise is large enough to have labor specialization such as full-time feed mixer and nutritionist, livestock handler, veterinarian, or market specialist.

In conclusion these estimates indicate that in hog production and cattle feeding with modern equipment, which makes the job easier, large reductions in cost can be achieved in increasing the size of the relatively small enterprises. But the reductions in cost beyond the 60- to 80-litter hog enterprise or the 75 head of cattle enterprise are very small. These cost reductions can easily be offset by the increased risks and management requirements. This does not mean that the trend of specialization in cattle feeding and hog production will not continue, but it does indicate that those managers who combine these enterprises in the complementary and supplementary framework with feed grain production will be able

to compete successfully with the nonfarm related hog production and cattle feeding enterprises.

In the dairy enterprise the cost analysis leads one to conclude that the present trend of expanding the individual dairy enterprise will continue and the complete disappearance of the small enterprise is not far away. Adding to this the continuing increased sanitation requirements which call for even more mechanization and high cost facilities, the rate of change to large scale dairy enterprises may even increase. Probably the major limit on the size of the dairy enterprise is whether the product can be marketed at a high enough price to assure the returns will attract the level of management needed to handle the production and labor problems associated with large scale production.

DISCUSSION: ECONOMIES OF SCALE IN LIVESTOCK PRODUCTION

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Professor Howell has stated the importance of economies of scale in livestock production for the evaluation of increased specialization and geographic relocation trends in agricultural production. After presenting examples for beef, pork, and dairy production, he concluded that relatively large cost reductions can be achieved in hog and cattle feeding by increasing the size of the small enterprise; but beyond the 60- to 80-litter hog enterprise or the 79-head-of-cattle enterprise, cost reductions are very small and can easily be offset by other factors. In dairy production, Professor Howell sees more positive evidence of the disappearance of the small enterprise.

At this point, I would like to introduce some pertinent research results concerning western U.S. livestock production for purposes of comparison, and comment generally on the economies of scale in agricultural production.

A recent study of cattle feeding costs in Arizona concerns feedlots considerably larger than those described in Professor Howell's paper.[1] In this study, the smallest feedlots averaged 238 cattle per year and the largest feedlots averaged 16,545 cattle per year. While Arizona feedlot operators practice much shorter feeding periods than those described by Professor Howell (and the two groups, therefore, are not directly comparable), cost differences for the larger feedlots are certainly significant. The Arizona study was concerned with nonfeed costs only—costs associ-

[1] Moran, Leo J., *Nonfeed Costs of Arizona Cattle Feeding*, T. Bul. 138, Agr. Expt. Sta., Univ. of Ariz., Tucson, Dec. 1959.

ated with investment, labor, nonlabor wages, death loss, veterinary and medicine, and miscellaneous factors. The total nonfeed costs averaged $18.30 per ton of feed for the smallest feedlots and $5.56 for the largest feedlots.

This is a cost reduction of 70 percent, or a much larger percentage change than that described by Professor Howell. The cost reductions are similar, however, to those presented by Professor Howell in that most cost reductions resulted from expansions of the smaller feedlots, with cost reductions decreasing as larger feedlots sizes were approached. Most of the cost reductions in the Arizona study were due to more intensive investment use,[2] but some were noted for other factors, particularly labor and nonlabor wages. Statistical analyses revealed that if the intensity of investment use was held constant, average costs increased as physical size of feedlot was expanded; or, diseconomies of scale were experienced. A major unanswered question in this study was whether the smaller feedlots currently realizing high costs because of low intensity investment use could achieve more intensive investment use if originally planned properly.

A study of California feedlots also found considerable cost reductions associated with size of feedlots among much larger operations than those discussed by Professor Howell.[3] Groupings of feedlots ranged from 784 to 35,568 cattle fed annually and gross nonfeed daily costs per head ranged inversely with size from 12.6¢ to 8.6¢ (a 32 percent reduction). The declining-cost nature of California cattle feeding observed in this study, as in the Arizona study, was due primarily to more intensive use of investment items among the larger feedlots.

Milk production costs in Arizona offer another example of economies of scale in western livestock production. A 1960 study of dairy costs in that State indicated an average production cost of $5.83 per hundredweight of milk.[4] The smallest dairies studied had an average cost of $7.18 per hundredweight (33 cows), while the largest dairies studied averaged $5.30 per hundredweight (214 cows). Part of the cost reduction was due to higher production per cow in the larger herds, but a significant proportion was due to more efficient use of production factors as size of herd was increased. For example—labor, investment, and management costs totaled $100 less *per cow* in the largest herds than comparable costs in the smallest herds.

[2] Intensity of investment use was expressed as the number of tons of feed per $1,000 of nonland investments.

[3] Hopkin, John A., *Cattle Feeding in California*, Econ. Dept., Bank of America, National Trust and Savings Assn., San Francisco, Calif., Feb. 1957. Also summarized in this Journal, May 1958, pp. 417-429.

[4] Moran, Leo J., and Green, Wallace R., *Arizona Milk Production Costs*, T. Bul. 141, Agr. Expt. Sta., Univ. of Ariz., Tucson, June 1960.

Most of the cost economies of scale in livestock production discussed in this meeting are caused by more intensive use of one or more factors of production as size is increased; or, in other words, most of these cost savings are due to variable proportions. There are as many "lengths of run" involved in planning the production process as there are factor inputs, and the technical aspects of these many factors must be studied before reaching valid conclusions regarding the significance of cost differences among livestock enterprises of different sizes. To properly study these technical problems in conjunction with the economic analysis usually requires an interdisciplinary approach. For example, engineering talent might be able to design lower investment systems for smaller feedlots that would permit sufficiently high investment use to narrow the gap in investment costs per unit of output between the larger and smaller feedlots. Then, perhaps, other factors such as risk, as mentioned by Professor Howell, would offset the cost advantage of the larger feedlots. With the cost differences currently being observed, however, it appears that the risks of not expanding are greater than those associated with expanding.

The large western feedlots and dairies have also achieved sufficient size to experience scale returns of a more "pure" form, such as returns to scale from division and specialization of labor, supervision, machines, and other factors of production. These larger livestock operations have also achieved market economies in the purchase of inputs in addition to the internal physical economies.

The role of vertical integration in agriculture is another research area where economies of scale are important. As vertical integration is one method of diversification for farm producers, the amount of capital that can be profitably diverted to other steps of agricultural production, processing, and marketing will be partly determined on the basis of economies that are foregone by limiting the size of the basic producing unit in order to divert these funds.

Finally, the nature of most farm enterprise expansion—which involves mixtures of effects from variable proportion, more "pure" scale changes, and market advantages—indicates that agricultural economics workers must continually strive to isolate the effects of individual cost items as size of business expands. If this is not done, economies from one source may hide diseconomies from another source, and the proper expansion path for farm enterprises will not be identified. A major purpose of economies-of-scale studies is to recommend methods of expansion to individual farmers; it is not sufficient to say that he will be better off if he expands. The individual influences must be identified so that the farmer can expand in the most efficient manner.

IMPLICATIONS OF ECONOMIES OF SCALE TO NATIONAL AGRICULTURAL ADJUSTMENTS

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THE framers of this topic obviously thought that some cause-effect relationships exist between economies of scale and national agricultural adjustments. In this paper, I shall cast some doubt as to the existence of such relationships. Essentially, my argument is this: (1) Because of fuzzy techniques in defining and quantifying economies of scale, our studies of the economies of farm size provide us with little clear evidence of economies of scale. (2) Especially vulnerable is the common generalization that unit costs are high on small farms and low on big farms. Without this generalization, the supposed relationships between economies of scale and national agricultural adjustments collapse. (3) National agricultural adjustments are explained by cause-effect relationships other than economies of scale.

Defining Economies of Scale

Let us begin with a definition so that we will use the same words to mean the same things so far as possible throughout this discussion.

"Economies of scale" has been a favored topic for economic theorists for a very long time. In general we agree that the expression refers to changes in average unit costs that are related to changes in scale or size of the firm or enterprise. The picture of a series of average cost curves for individual firms of different sizes plotted on the chart and connected by an envelope curve comes readily to mind.

Such a set of curves implies that there is a least-cost combination of inputs for each firm and that the firm whose curve rests on the low point of the envelope curve is most efficient. I have no quarrel with this picture for purposes of this paper. We differ little in our concept and acceptance of the theory, but we differ greatly in the manner and techniques with which we apply it.

Before we go further in considering the implications of economies of scale, we need to look carefully at how we get average cost curves for individual firms. Our literature reports hundreds of studies dealing in one way or another with economies of scale. The very earliest work of Spillman, Boss, and Warren showed that big farms made more money than little ones. Since their time, there have been few farm management people who have not concerned themselves with problems of scale or size.

[1] The author is indebted to Dr. John Brewster, Farm Econ. Div., Econ. Res. Serv., for comments on this paper.

Despite vast experience with such studies, our techniques for defining and quantifying economies of scale are particularly fuzzy.

One source of our lack of precision relates to confusion between economies of scale and economies of variable proportions. It is difficult to see how one can get economies of scale without changing the input mix. This point has been debated by theorists more apt than I, and I shall not dwell upon it here. My point is simply that a review of our literature on the question of economies of scale reveals a lack of preciseness of terms and methods. Much of the time we are talking only about variable proportions when we think we are talking about economies of scale.

Another source of lack of precision relates to our bookkeeping or accounting techniques, especially as they are applied (1) to operator and family labor, management, and enterpreneurial income and (2) to pricing of relatively fixed factors in production.

A search of past studies reveals that we have handled the matter of operator income in at least three ways.

(1) In distributing gross income to the factors of production, we have left operator labor and management income as the residual claimant. (Sometimes we even let income to owned capital remain in this bag.) When we do this, we say in effect that operator labor is a free resource to the business up to the limit of working time available. This biases our notion of economies of scale—especially for heavy labor-consuming enterprises—toward the size of enterprise or firm that maximizes operator labor.

(2) We have calculated operator income—or a family living allowance—as a fixed cost against the business. This makes unit costs for small businesses look high. It results in an excessive charge against production when the labor of the farm operator is underemployed.

(3) Occasionally, we charge operator labor as a variable cost to the business. In other words, we charge the business at some predetermined rate only with the operator labor actually used in production. This technique tends to depress the apparent advantage of bigness in the farm business. It also tends to ignore the matter of maximizing operator returns.

In addition to the problem of handling returns to operators for labor, capital, and management, we have experienced difficulty with pricing the relatively fixed capital investments in the farm business. Investment cost of machinery looms large on most farms. Usually, moreover, machinery is a rather "lumpy" input. How do we price it in our accounting techniques to reflect truly the economies of scale?

In scanning past studies, I find that many different techniques were used. Sometimes farmers were asked what their machinery was worth,

item by item. Sometimes new prices for machinery were depreciated by some factor to reflect depreciation. Each of the techniques used left something to be desired. Frequently little farms have low unit costs for machinery and big farms have high costs, as well as the reverse. What we find depends a great deal upon the skill and luck of the individual farmer in meeting his needs for machinery; what we conclude depends upon the techniques we use in our accounting and upon how we analyze and report machinery costs to get at economies of scale.

Getting a price or setting a price for land is another point at which wide differences in cost accounting occur. If farmers are asked what they paid for land, discrepancies due to different dates of purchase, different terms of transfer, and others, will arise. If an imputed value is used for land, factors other than land productivity may influence our judgment. If we use values set for tax purposes, we are plagued by all the vagaries of tax assessment procedures. All of these methods, and others, have been used in farm management studies.

One other major variation occurs in the techniques of analyzing costs in relation to scale. Some studies, especially the older ones, depended entirely upon data as reported in farm surveys. If one farmer said his 12-foot combine cost $2,000 and another said $3,000, $2,500 was used as the cost of the combine. Other, less obvious, illustrations could be given, but this serves to make the point. More sophisticated researchers are inclined to build hypothetical firms of different sizes, to standardize the resources and costs for each, and to program the enterprises to arrive at least-cost combinations. This technique avoids the distortions encountered in real data. An example of the latter technique is reported by Carter and Dean in the May 1961 issue of the *Journal of Farm Economics* and by Scoville and Fellows in earlier studies.

Each of the techniques for "costing" fixed capital items and returns to farm operators gives us a different view of the relationship between average unit costs and size or scale of business. Many of the published reports of past studies are not explicit as to the techniques used. Therefore, comparable or even valid conclusions regarding economies of scale cannot always be drawn from them.

My purpose in mentioning these rather elementary elements in techniques of economic analysis is simply to point out that from all our empirical research of the past, we really have very little precise knowledge about economies of scale in agriculture. We do know in a broad general way that unit costs decline as farm size increases, at least up to the size of the reasonably efficient one- or two-man farms. The cost curve generally levels out beyond that point in the size scale and may extend virtually horizontally over a wide range of sizes. Even this generalization must be accepted with considerable caution and with the

recognition that in reality a great many individual firms have unit costs at considerable variance to those that would be expected from the generalized envelope curve.

Economies of Scale and Agricultural Adjustments

Why be concerned with economies of scale and what does this have to do with national agricultural adjustments? I suppose our concern grows out of the implication in our body of theory that high-cost firms cannot survive in a competitive economy. The notion is widely accepted that small firms have high costs, hence small firms will not survive. There is the further implication that family farms are small and that large farms are not family farms, hence our concern over the changing structure of our agricultural economy and society.

Let us look at some things that appear to be facts in this case. In the first place, I am not at all sure that we can accept the little-farm–high-cost –big-farm–low-cost generalization. In the real world, we find so many deviations from the rule that the rule itself is questionable. One reason for this doubt lies in our techniques for calculating costs, especially as they relate to operators' labor and management. If operators of little farms charge the farm business only for the time actually needed in farming, their unit costs may be comparable to costs on larger farms. If such an operator has other remunerative use for his time not spent in farming (as many do, according to data on off-farm employment), it is proper for him to calculate costs in this way. If, in addition, his costs for machinery and land are low, he may quite well be producing at unit costs equal to or below those of larger farms. In reality, many little farms do survive in the highly competitive business of farming.

But, you will say, look what has happened to the size of our farms in the last 30 years and look at the dire straits of our farmers, particularly the small farmers. I readily agree with what you are thinking, but let us speculate as to some reasons for the trends we observe.

General statistics about trends in size of farm in this country are too well known to this audience to dwell on them here. Numbers of farms have decreased about 1 million in the last decade—to use a round number. The number of farms grossing more than $10,000 has increased 65 percent since 1945 while the number of those having sales of less than $2,500 has decreased 40 percent.

These trends tend to prove the validity of the notion that small firms have high costs, and therefore do not survive in a competitive economy. And so they may, but the state of our research on economies of scale is such that I doubt whether we can prove this cause-effect relationship.

I suggest that there may be other, more potent, causes for the current

trends in size of farm. Farm technology, particularly farm mechanization, gives farmers the physical capacity to operate larger enterprises than they could operate with horse equipment. They are now able to reap to themselves the net returns from larger farms. Thus, they are able to increase their income, and this is a strong incentive to increasing size of farm. This incentive and this trend operates irrespective of economies of scale, in the strict sense of the word, or of unit costs. Increased size of firm may increase income to its operator independent of changes in unit costs.

The desire to concentrate income from larger enterprises is one side of the coin. Is the desire to escape small incomes from small farms the other side of the same coin? I submit that small farms do not necessarily have high unit costs, although I am sure that some do. Nevertheless, small farms do produce small incomes simply by virtue of small volume of sales.

If we are to explain changes in size of farms, we need to ask ourselves, Do the small incomes from small farms drive people out of farming? Answering this question may be like pondering whether the hen or the egg came first, but I suggest that small incomes do not drive people out of agriculture.

Rather, I suggest two hypotheses that seem more likely to explain the decline in numbers of small farms. One is that the prospect for a small income from a small farm discourages new entrants into this stratum of agriculture, and thus the small firm is not replaced with successive generations of operators.

The other is that the opportunity for larger incomes elsewhere draws people away from the small farm instead of the small income from the farm driving them from it. Thus we meet the old "opportunity cost" principle that we learned in "Econ I-A." If the opportunity cost is high for an operator to remain on a small farm and if we wish to include such a cost in our calculation of unit costs of product, we can easily show economies of scale for larger farms.

The question of whether people are pushed off farms by low incomes or pulled off by better opportunities elsewhere is not one of tweedledum and tweedledee. It is fundamental to our thinking about national agricultural adjustments and the policies or programs needed to induce adjustments. If low incomes alone would bring about adjustments in agriculture (as classical economics and some politicians claim), we would have been adjusted long ago.

If, however, we recognize that excessive numbers of small firms producing small incomes for their operators is one of agriculture's problems and that opportunity for income elsewhere draws people out of farming, we have gone a long way toward the basis for a national adjustment program. How to do this is a different matter and the subject for a different paper.

Let us get back for a moment to the question of economies of scale and national agricultural adjustments. I have implied that our empirical studies and the techniques used in them were not precise enough to demonstrate economies of scale between small and medium-sized farms except under fairly rigid assumptions with respect to pricing inputs. We are even more at a loss to demonstrate economies of scale from medium forms on up the spectrum of size.

Accepted economic theory tells us that unit costs decrease with increasing size of firm until the most efficient firm is reached; beyond this point, diseconomies set in to increase units costs with increased size of firm. Logic supports this proposition, but we have not supported it very well, especially in the upper end of the scale range, by our research. We simply do not know where diseconomies of scale set in as size of firm progresses.

At the same time, we have little reason to believe that any substantial reduction in unit costs is achieved for most types of farming beyond those firms having gross sales of about $25,000. Agricultural economists have studied big farms very little; they have shown more concern for little ones. It is more difficult to generalize about big farms because their numbers are few, and each is more likely to be associated with unique characteristics of management, history, or geography. A big Montana wheat farmer says he cannot grow wheat any cheaper than his neighbors who operate much smaller farms. I believe him, and I believe that most really big farms have no cost advantage over the well-organized and well-managed "medium large family farm."

The point of this observation in the context of our subject is that while average size of farm is increasing and probably will continue to increase for a long while, there is no evidence to indicate that the huge bonanza farm will dominate agriculture, except possibly for a very few specialized types of farming. Virtually all the economies of scale—if there are such—appear to be achieved within the size range that we identify as family farms. This is explained partly by the fact that family farms are getting larger because innovations give the farmer the ability to do more work, and that farms formerly larger than family-size are becoming family farms because of shifts in enterprises and substitution of capital for labor.

If bonanza farms are not to dominate agriculture, the industry will continue to have a large number of firms. The number will not be 4 million or perhaps not even 2 million, but it will remain large enough so that the output of no one firm will influence total output significantly. In other words, no one firm will have a measurable monopoly influence. This means that if and as adjustments are made in aggregate output, they will need to continue to be made through group action, probably includ-

ing government action. Recognition of this fact is significant also in our thinking of national agricultural adjustments. It leads us to recognize that government has a definite place in agricultural affairs other than just the expediency of meeting emergencies.

One factor that has strongly influenced number of farms is the continuing cost-price squeeze. Does the downward pressure of commodity prices and the upward pressure of factor prices affect farms of different sizes in different ways? The farmer with a small volume of sales may feel keenly any reduction in price of product. Conversely, the large farm operator has a higher proportion of cash out-of-pocket costs, so he feels keenly any increase in cost of inputs as well as decreases in product prices. He can go broke quicker. Firms with high unit costs obviously are most vulnerable to the cost-price squeeze. Whether high unit costs are associated with small size remains questionable.

Before leaving our consideration of scale of farming and national agricultural adjustments, let us make a passing bow to some of the obvious relationships.

1. Acreage-allotment and acreage-reserve programs restrict the size of specific enterprises within the firm. The operator who is tooled up to till 1,000 acres and may now produce only 400 acres of his main money crop, obviously has higher unit costs in the short run unless his tools can be used for other purposes. The wheat farmer who shifts his diverted land from wheat to barley or sorghum grain probably does not experience increased unit costs because the same machinery may still be used to capacity. But if his only alternative to wheat is idle land, he does. The cotton farmer who shifts his diverted acreage to soybeans probably increases unit costs, because his cottonpicker will not harvest beans. He must "tool down" his cotton enterprise and "tool up" his bean enterprise. These factors help to explain the pressure for farm enlargement in cotton, wheat, and feed-grain areas.

2. Many policies and programs have tended to favor the small firm. FHA loans, acreage limitations on Federal reclamation projects, progressive income taxes, limits on cost-share payments and price-support commitments—to name just a few. These programs may have had some retarding influence on the trend toward larger firms, but probably it has been neither great nor measurable. In contrast, some policies and programs seem to encourage the trend toward larger firms—acreage allotments, acreage reserves, the new feed-grain program, and the similar wheat bill now before Congress. Whether either of these groups of programs affect materially the location and shape of the envelope curve of average costs is doubtful. I hasten to repeat that the shape and location of the cost curve depends a great deal upon how costs are calculated.

Conclusion

Where does this leave us in our review of implication of economies of scale to national agricultural adjustments? First, I question whether economies of scale have had much to do with current trends in size of farm. At least I doubt that we can demonstrate this relationship because of the many different techniques used in calculating costs relative to scale.

Second, average size of farm is increasing, as we all know. I suggest that this is more a function of a farmer's ability to handle a bigger unit with power machinery and of his desire to get more income than it is of economies of scale—even if they exist.

Third, even with increasing average size of farm, there is no reason to believe that eventually farms will be so large and so few that each could influence volume of output and price. Agriculture will remain an industry with a large number of firms, though fewer than now. Therefore, adjustments in aggregate output and price will continue to be made through group action.

Fourth, small farms produce small incomes, regardless of the question of unit costs or economies of scale. Small incomes do not necessarily drive people off farms thereby effecting adjustments in the man-land ratio. Small farms may not perpetuate themselves with succeeding generations of operators, but, more important, people leave agriculture because of better opportunities outside, not because of poor opportunities within. Thus an important basis is laid for adjustment programs designed to improve the economic status of people in farming.

Fifth, we need badly a good series of studies aimed at measuring differences in costs as related to scale of farming. Such studies should cover many different types of farming and the same techniques of "costing" should be used throughout the series. With such studies, we could be more precise than I have been about the implication of economies of scale to national agricultural adjustment.

DISCUSSION: IMPLICATIONS OF ECONOMIES OF SCALE TO NATIONAL AGRICULTURAL ADJUSTMENTS

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In his initial statement Mr. Upchurch indicated that those who selected his topic obviously thought that some cause-effect relationships existed between economies of scale and national agricultural adjustments. One might also hypothesize from the title that the program planners

were thinking of relationships *associated* with economies of scale and agricultural adjustments rather than *cause-effect* relationships. However, I think the approach taken by Mr. Upchurch has provided us with an interesting paper.

After making an assumption on the thoughts of the program planners, Mr. Upchurch developed his paper mainly along the thesis that (1) because of fuzzy techniques in defining and quantifying economies of scale, studies on economics of farm size fail to provide clear evidence of economies of scale and (2) without evidence of economies of scale, the relationship between economies of scale and national agricultural adjustments collapses. I would like to briefly discuss these points.

Mr. Upchurch first defined economies of scale and then discussed techniques used in studies relating to economies of scale. He indicated that economies of scale refers to changes in average unit costs that are related to changes in scale or size of the firm or enterprise, and that there is a least-cost combination of inputs for each firm with the firm on the low point of an envelope curve being the most efficient. He further indicated that ". . . from all our empirical research in the past we know little precisely about economies of scale in agriculture." I am willing to accept his definition for purposes of this discussion, but I would hasten to add that, although it is not clear to which studies Mr. Upchurch was referring, it is doubtful that very many of these were designed *specifically* for studying economies of scale as defined in his paper.

Mr. Upchurch indicated that he accepted the general concept of declining unit costs with an increase in farm size up to a reasonably efficient one or two-man farm, and at that point the costs generally levelled out over a wide range of sizes. Although accepting the general concept of the shape of the planning curve as indicated by the previous statement, he then appeared to introduce some contradiction by his questioning of the existence of economies of scale. One receives this impression when he states that "our studies of economics of farm size provide us with little clear evidence of economies of scale" and "especially vulnerable is the common generalization that unit costs are high on small farms and low on big farms." I would agree that adequate information is lacking about the shape of the envelope curves in agriculture. Economic theorists long have indicated the inconclusiveness of the shape of the long run cost curves as well as the complexity of measurement of economies of scale.[1] However, it seems that little evidence is provided by Mr. Upchurch on the non-existence of economies of scale.

The review of commonly used accounting techniques by researchers in

[1] For example, see Stigler, George J., "The Theory of Price." The Macmillan Company, New York, 1952, pp. 142-5.

computing average costs for individual farms was helpful in calling our attention to some of the precautions to be used in comparing costs. However, I doubt that his discussion of lack of similarity of results from use of different techniques provides a basis for casting doubt on the existence of economies of scale. It merely points out the problem of measurement. Perhaps one might argue that a greater contribution could have been made by expanding on the use of some adequate research techniques which would permit studying and testing the concept of economies of scale, rather than on the shortcomings of techniques used in the past.

There are several studies which have been specifically designed for studying economies of scale which do illustrate their existence. One such study is that by Carter and Dean mentioned by Mr. Upchurch.[2] Results of this study provide some implications on techniques that might be used in testing economies of scale for multiple product farms. In this study the authors compared several methods for developing the envelope or planning curve. These curves were derived using regression analysis applied to cost data from farms, as well as budgeting and linear programming techniques applied to synthetic farms. The authors placed least confidence in a regression equation fitted directly to costs obtained from farms. This approach was criticized because it resulted in a curve passing above the true envelope curve giving the so-called regression fallacy. Greatest confidence was expressed for an envelope curve derived by linear programming analysis with the curve showing optimum enterprise combinations at each level of output. This latter type of analysis involves some restrictions and assumptions that some researchers might not wish to accept. For example, capacity of power machinery was considered as the major fixed resource for developing short run cost curves and constant product prices (or relative prices) were used in the analysis. Nevertheless, this approach is mentioned in that it offers a start in the ". . . series of studies aimed at measuring differences in costs as related to scale of farming" as aptly suggested in the concluding remarks by Mr. Upchurch. Modern computing facilities would permit consideration of many alternative resource and technological combinations in such studies. Before leaving this topic, it is interesting to note a conclusion stated in the article by Carter and Dean, ". . . analyses clearly indicate that cost economies are one reason for the present trend in consolidation and expansion in size of smaller units in Yolo County."[3] They further indicate that the analyses do not indicate a strong incentive for expansion to extremely large size, which agrees with a conclusion drawn by Mr. Upchurch.

[2] Carter, H. O. and G. W. Dean, "Cost-Size Relationships for Cash Crop Farms in a Highly Commercialized Agriculture," *J. Farm Econ.*, 43:264-77, May 1961.

[3] Carter and Dean, *op. cit.*, p. 277.

In the section on "Economies of Scale and Agricultural Adjustments" the trend toward larger farms was explained mainly by causes other than economies of scale. It was hypothesized that the trend of a decrease in small farms is attributed to low incomes which discourages replacement by successive generations and the opportunity for larger incomes elsewhere. Further, it was indicated that the desire to increase incomes is a strong incentive for increasing farm size. I would agree that Mr. Upchurch has provided us with some of the main incentives for trends but I suggest that these can't be separated entirely from economies of scale, that this is one item in a total bundle of factors. However, in view of the authors basic assumption that the program framers thought there were cause-effect relationships between economies of scale and national agricultural adjustments, I would admit that research results do not prove a cause-effect relationship. Obviously, one cannot overlook such items as prices and pricing structure, management, institutional arrangements, general economic conditions in other sectors of the economy, sociological implications, risk and uncertainty in explaining farm size.

The criticism of accounting techniques provided by Mr. Upchurch in his paper, along with the lack of adequate information on economies of scale are important points. It raises the question as to whether farm management and production economics researchers have been too willing to accept customary techniques and to spend much of their time studying existing types of farms, and with some exceptions, placing too little emphasis on projections into the future. I believe that this paper by Mr. Upchurch offers a challenge to our profession toward increased emphasis in research on economies of scale. At the same time, however, I would hope that greater emphasis might be placed on research dealing with potential adjustments in the agricultural economy which are associated with larger farms.

IMPROVEMENT OF THE MANAGEMENT RESOURCE IN AGRICULTURE

CHAIRMAN: W. D. TOUSSAINT, NORTH CAROLINA STATE COLLEGE

IMPROVED MANAGERIAL PROCESSES FOR FARMERS[1]

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I BELIEVE that one of the ways human resources used in agriculture can be made more effective is through the discovery of improved managerial processes and then teaching those processes to actual and prospective farm managers.

In recent years, there have been important theoretical and empirical contributions in the area of human behavior in general and in management in particular. New insights which can be applied to the management of farms are available from the other social and behavioral sciences, from the humanities, from statistics and mathematics, from the other applied management fields such as operations research, and from within agricultural economics itself.[2]

A necessary step in the development of any body of knowledge is the formulation of hypotheses or theoretical solutions. I have formulated 10 hypotheses regarding managerial processes for farmers. I do not pretend that this list constitutes a complete model of improved managerial processes—it is only a partial list of the kind of hypotheses that are needed.

In formulating the hypotheses I have drawn heavily on various bodies of theory.[3] I have also drawn on observations from my experience in

[1] I would like to acknowledge the help I received from my colleagues at Mich. State Univ. who read previous drafts of the paper and offered helpful comments and criticisms: Professors Vernon L. Sorenson, James D. Shaffer, and Glenn L. Johnson of the Dept. of Agr. Econ. and Professor Carl Frost of the Dept. of Psychology.

[2] A notable example of a major research project which made contributions both to the theory of management and empirical testing in agriculture is the Interstate Managerial Survey (IMS). The results of this research provide useful descriptive material, tests of some hypotheses about farm managerial processes, and suggestions of some additional hypotheses. The results of this research have been reported in various articles in the *J. Farm Econ.* and in bulletins of the seven Expt. Stas. involved; a book has been written summarizing the methodology and major findings. See Johnson, Glenn L., Halter, Albert N., Jensen, Harald R., and Thomas, D. Woods (editors), *A Study of Managerial Processes of Midwestern Farmers,* in process, Iowa State Univ. Press, Ames.

[3] In formulating my hypotheses, I have drawn particularly heavily on the theoretical and empirical work in psychology. I was motivated to do this by the belief that psychology has a contribution to make to farm management, and the observation that farm management workers have made relatively little use of psychological theory and research. Other disciplines, of course, have equally important contributions to make to the study of management.

working with farmers, and to some extent on my own research into farmers' managerial processes.[4]

If we're trying to improve something, we need to know what it is we're trying to improve. Of course we're trying to improve the whole process of management. For my purposes, I take a managerial process model which includes the following eight processes or functions: (1) formulation of the goals or objectives of the firm or unit; (2) recognition and definition of a problem, or recognition of an opportunity; (3) obtaining information—observation of relevant facts; (4) specification of and analysis of alternatives; (5) decision making—choosing an alternative, which is the core of the management process; (6) taking action—implementation of the alternative selected (assuming that the decision was to take action); (7) bearing responsibility for the decision or action taken; and (8) evaluating the outcome.[5]

It should be emphasized that these processes or functions are all closely interrelated parts of a whole process. A manager does not necessarily proceed systematically from Process 1 through 8. In carrying out the management process, managers will frequently jump back and forth between these various processes. They may repeat one or more of the processes several times in connection with a given decision. They may also skip some processes.

Before formulating hypotheses regarding improved managerial processes, I felt the need for a criterion of what constituted an improved process. This left me in a dilemma since, as yet, we have no adequate basis for constructing such a criterion.

Economists in general and agricultural economists in particular have been largely normative in their approach to management. That is, they have centered their attention on what managers *ought to do*—assuming that the models of economic man postulated by traditional economic theory are applicable. These models assume an economic man who is rational, has considerable knowledge, a well organized and stable system of preferences ordered at least in ordinal terms, and chooses to maximize something (profits, utility, etc.). Developments in economic theory itself, particularly developments in the behavioral sciences, and actual study of

[4] Some of the hypotheses are supported, at least partially, by empirical work of various researchers, although none of them really have been proven in a formal sense. I have not attempted to differentiate them on the basis of the amount of empirical research presently available to support them, but rather refer to them all consistently as hypotheses.

[5] While this model is largely a theoretical statement of what constitutes the total managerial process, it does have some basis in empirical observation. Processes 3 through 7 constituted the model for the IMS, and IMS researchers report that their research tends to confirm that farm managers do perform these five functions and also the problem recognition function. Processes 1, 2, and 8 are based both on theory and on informal observation of the functions performed by farm managers.

managerial behavior raise considerable doubts regarding many of the assumptions on which these models are based.

I think we have sufficient clues that profit maximization frequently is not the primary goal of managers, farm or nonfarm. There is a question of whether managers necessarily try to maximize *anything*. Most importantly, however, our models have given insufficient attention to managerial behavior as influenced by man's limited access to information and limits on human capabilities to perceive, process, and analyze information. In short, those of us who have been involved in both theoretical and empirical work in management have given too much attention to normative theory and too little attention to behavioral theory.[6]

My task of stating a criterion for improved managerial processes is made more difficult by my recognition of the limitations on human capabilities as well as by my unwillingness to accept profit maximization as the goal of farm managers. In my system managers may have multiple and shifting goals and multiple and shifting means for attaining goals.

About the best I can say in the way of a criterion is that we are seeking ways in which to improve the quality, efficiency, or effectiveness of managerial behavior. I think application of improved managerial processes would improve farmers' abilities to formulate appropriate goals and would improve their abilities to attain their goals. I have attempted to outline processes that are superior to those presently being used by most farm managers, but still within what we know or guess to be the limits of human capabilities.

Hypotheses

One of the most important aspects of managerial behavior, and one about which relatively little is known, is what motivates managers to engage in managerial activity—when, why, and to what extent are they motivated to undertake any of the management processes such as those we outlined in our model.

I have drawn on Festinger's theory of cognitive dissonance[7] and some of Simon's recent work[8] to formulate my first hypothesis which is a behavioral rather than a normative hypothesis.

Hypothesis 1: *The nature of managers' perceptions of conflicts in their*

[6] Normative managerial theory specifies rules of behavior that managers should follow if they want to make the most of their situation, given certain assumptions. Behavioral theory attempts to predict under stated circumstances how managers will, in fact, behave. Both uses of theory are relevant and important in understanding and improving managerial behavior.

[7] Festinger, Leon, *A Theory of Cognitive Dissonance*, Row, Peterson and Co., Evanston, Ill., 1957.

[8] Simon, Herbert A., "Theories of Decision-Making in Economics and Behavioral Science," *American Econ. Review*, Vol. 49, June 1959, pp. 253-283.

own minds will have an important influence both on the extent to which they engage in conscious managerial activity and the direction the managerial activity will take.

Conflicts which lead to managerial activity may arise in an individual's mind in any of a number of ways, including: (1) when he perceives that any facts, beliefs or opinions that he holds are not consistent with other facts, beliefs, or opinions that he holds, (2) when he observes that any of his values conflict with other of his values, (3) when he observes that his own behavior is not consistent with any of his values, or (4) when there is disparity between his goals and achievement of his goals. These conflicts are more apt to arise under conditions of change, uncertainty, and the need to make decisions.

Festinger refers to internal conflict as "dissonance." According to him, conflict or dissonance is a form of psychological discomfort and an important motivating factor. When an individual feels the presence of internal conflict, he is motivated to try to eliminate or reduce it.

We are hypothesizing here that the kind and amount of internal conflict a manager perceives will have an important impact on his managerial activity. For example, it may influence (1) the extent to which the manager perceives a problem and the way in which he defines it, (2) whether or not he will search for new alternatives, and, if so, the nature of the alternatives he will seek or admit, (3) the extent to which the manager searches for information, and the direction of such information seeking.

As an example of how internal conflict may serve as a motivating factor, discrepancy between goals and goal achievement can be a powerful motivating factor leading to managerial activity designed to fulfill the goals (providing the discrepancy is held within bounds). Another example —after a manager has made a decision, a problem may appear in the form of doubts in his mind as to whether or not he made the right decision. This conflict (doubt, uneasiness) may motivate further managerial activity, especially seeking information which will reduce the conflict—either by convincing the manager he made the right decision, or by convincing him he was wrong, and then by changing the decision.

My second hypothesis is also a behavioral hypothesis and is somewhat related to the first.

Hypothesis 2: *Cognitive processes used by managers will screen out and distort much of the information to which they are exposed.*

Both Festinger and Simon emphasize cognitive processes screen and distort much of the information available. According to Simon, a decision-maker's information about his environment is much less than an approximation of the real environment. The differences between the per-

ceived and the "real" world are due to omissions and distortions, and arise in both perception and inference. The bottleneck of a human's perceptual apparatus will admit only a small percentage of the information to which the person is exposed. Further significant omissions occur in the processing when information reaches the brain.[9]

Festinger emphasizes the distortions which take place when an individual receives information not in agreement with previously held knowledge or beliefs. When individuals come in contact with information apt to cause conflict, he notes that they attempt to escape or avoid further exposure to the information, and erroneously perceive and interpret the information.[10] Much of the distortion probably takes place subconsciously.

The relevance of this hypothesis is that it provides insights into human limitations in the use of cognitive processes—limitations which must be reckoned with in attempts to improve the managerial processes of farmers. Recognition of these limitations, however, does not rule out the possibility of developing and teaching improved perceptual models to farmers.

The rest of my hypotheses are largely normative; that is, I address myself to statements about what managers ought to do (but still keep human limitations in mind).

Hypothesis 3: *Superior managers will consciously formulate a set of goals and will strive to reconcile competing goals. Further, they will set goals that represent realistic possibilities of attainment, and will adjust their goals from time to time.*

The formulation of goals is essential in effective management because goals give direction to the whole managerial process. They help suggest the existence of problems or opportunities, and have an impact on the way managers define problems. Goals provide some direction to farmers' search for new alternatives (whether there will be any such search, and if so, in what direction). Objectives are particularly crucial in the decision-making step in influencing which solution or action will be accepted.

A farmer's value system will have an important impact on the goals he selects (even if the impact is subconscious). If the farmer consciously formulates his objectives he will also be influenced by some important things in his environment; for example, his family situation, resource situation, social and cultural setting, etc.

Most farmers will have a number of goals, some of which may be in conflict with others. Superior managers will attempt to resolve conflicts and attach priorities; however, a complete, consistent ordering of objectives is probably seldom attainable.

Ideally the manager will think in terms of long-run and a series of

[9] Simon, *op. cit.*
[10] Festinger, *op. cit.*

short-run goals which will serve as means of attaining the long-run goals, although this ideal also will seldom be met.

Superior managers will set objectives that are high enough to provide a challenge to themselves but which will still be within realistic possibilities of attainment.

Further, superior managers will adjust their goals in response to changes in circumstances (stage in family cycle, for example) and in response to progress in goal achievement.[11] Adjustment may occur at any stage in the managerial process. While a continuous process of goal adjustment would probably be the ideal, a periodic stock taking, perhaps spurred by specific events, is about all one should realistically expect of farmers.

Hypothesis 4: *Superior managers will quickly perceive the existence of problems or possibilities for improvement, and will formulate the problem clearly enough in their minds so that they see what difficulty needs to be overcome or what kind of opportunity is open.*

Many psychological investigators, as well as philosophers and others, have focused attention on the importance of problem recognition as a prerequisite to sound thinking and reasoning. Psychologists stress the way a person sees the problem is the first phase of the solution. Before effective problem solving activity can take place, the subject must see the correct difficulty to overcome in the problem.[12]

Recently Lee and Chastain focused attention on the importance of problem definition in farm management.[13] To expect a farmer to go through a lengthy and deliberate subprocess of problem definition is probably not realistic for the most part. However, Lee and Chastain suggest definition of the problem may require some gathering and analysis of information, and formulation and appraisal of alternative definitions before the problem is properly defined.

Hypothesis 5: *Superior managers will develop the ability to think in abstract terms and will use methods of thinking which roughly approximate the application of theoretical concepts or principles. They will use both inductive and deductive reasoning processes.*

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[11] While goals can serve as a motivating force in the shorter run, in the longer run wide disparity between strongly held goals and lack of achievement leads to stress. In this connection, Simon pointed out that if performance falls far short of the level of aspirations and if the goal level is not adjusted quickly enough, emotional behavior or neurosis will replace rational behavior. See Simon, Herbert A., "The Role of Expectations in an Adaptive or Behavioristic Model," Ch. 3 in *Expectations, Uncertainty, and Business Behavior*, edited by Bowman, Mary Jean, Social Science Research Council, New York, 1958.

[12] Gibson, E. J., and McGarvey, H. R., "Experimental Studies of Thought and Reasoning," *Psychological Bul.*, Vol. 34, 1937, pp. 327-350.

[13] Lee, Jr., John E., and Chastain, E. O., "The Role of Problem Recognition in Managerial Adjustments," *J. Farm Econ.*, Vol. 42, Aug. 1960, pp. 650-659.

The ability to think in abstract terms, to apply principles, and to use both inductive and deductive reasoning is useful at various stages in the management process—in recognizing and defining problems, thinking up alternatives, deciding what information may be worth gathering, analyzing alternatives, etc. Reasoning processes particularly come into play when a manager attempts to project the future consequences of a proposed decision or action.

Even though the concepts are not applied precisely, the manner of thinking associated with attempts to apply principles may help the manager see the relevant facets of the problem and help him avoid pitfalls.

Psychologists have pointed out there are three major aspect of conceptual thinking: the importance of looking for categories, recognition of many possibilities rather than merely the first one to occur, and consideration of the total system.[14] These considerations are all important to farmers. First, classification, in addition to being a simplifying and economizing procedure, will facilitate a manager's thinking in defining problems and in gathering, processing, and storing information. Secondly, consideration of several alternatives will frequently improve a farmer's decisions. Thirdly, decisions and actions frequently have an impact on the whole farm business.

Reasoning processes are generally classified into the two types, induction and deduction.[15] In the past many farm management workers have assumed that farmers used inductive thought processes largely, if not entirely. The IMS research revealed the extent farmers use deductive processes has been grossly underestimated. Nearly half of the respondents on the survey gave verified examples of written budgeting and nearly three-fourths gave examples of mental budgeting. One-sixth of the farmers indicated they reasoned marginally in determining size of the hog enterprise. All of these activities require, and therefore demonstrate farmers' ability to use, deductive reasoning.[16]

According to Dewey, when people do think, the complete act necessarily involves both inductive and deductive thought processes, and these two are interdependent phases of the same operations.[17]

Hypothesis 6: *Faced with a difficult problem to solve, superior managers*

[14] Gibson and McGarvey, *op. cit.*

[15] The inductive process involves reasoning from a specific experience or observation, then checking the proposition for accuracy against reality. The deductive process consists of reasoning from propositions that are known or assumed to be true. Budgeting linear programming, and marginal analysis are specialized and refined forms of deduction.

[16] Knight, Dale A., and Greve, Robert W., *Farmer Use and Understanding of Inductive and Deductive Reasoning and Figuring Costs and Returns,* Tech. Bul. 107, Kans. Agr. Expt. Sta., March 1960, and *A Study of Managerial Processes, op. cit.*

[17] Dewey, John, *Logic, The Theory of Inquiry,* Henry Holt and Co., New York, 1938, pp. 419-441.

will alternate concentrated analysis and thought with periods of detachment from the problem.

On the one hand, concentrated thought and effort is required in problem-solving. On the other hand, prolonged concentration on a problem may lead to fatigue and possibly to confusion and frustration.

In studies psychologists have made of thought processes used by scientists, scientists have stressed the necessity of preliminary intensive study of the problem followed by a period of temporary abandonment sometimes referred to as an "incubation period." The scientists stressed the need for rechecking their assumptions and frequently the need to talk the problem over with someone else. The scientists reported the solution usually came suddenly when they were not formally working on the problem. According to Gibson and McGarvey, these observations coincide very well with the results of experimental studies of errors in thinking.[18]

Hypothesis 7: *Faced with complex situations, uncertainty, and limited ability to perceive and process information, superior managers will use simplified managerial process models which ignore some variables and alternatives.*

The complexities of the world and the limits on human abilities create a number of difficulties for managers. First, we have already seen that managers are exposed to more information than the human mind can comprehend or process.

Secondly, in connection with complex organizational problems which farmers face, anyone with any imagination can think up numerous feasible alternatives. If a person considers only a few differentials for each of several variables, he can quickly outline more alternatives than can be analyzed by the highest capacity electronic computer in the country.

Thirdly, it is no trick to write down a formidable list of variables that may be involved in a change in farm organization. Farmers frequently have neither the mental ability nor the facilities to formulate expectations regarding the impact of important changes on all of the variables that "ought to be considered"—even in terms of means or modes, much less in terms of probability distributions.

Faced with such situations, effective managers will use simplified models which systematically ignore some variables and some alternatives —in the same manner in which scientists rely on models which are simplified in order to be manageable.

More specifically, in regard to information gathering Modigliani and Cohen argue that a manager faced with the inability to assimilate anything like the "ideal" amount of information may well use the following procedure: (1) narrow the range of variables by selecting those that he

[18] Gibson and McGarvey, *op. cit.*

thinks will have most affect on the decision, (2) decide some may have an effect, but that the cost of getting information is higher than gain that will come from knowing, and (3) decide it will be impossible to get information on some variables even if he tried, and so save the time and cost of trying.[19]

Then, before proceeding to the detailed analysis of alternatives, a manager can reduce the number of alternatives to manageable proportions by applying principles or using judgment in regard to the kind and number of alternatives it might be worthwhile to analyze.

Finally, to keep computations (mental, written, machine) within reasonable bounds, better managers will frequently settle for approximations of the optimum plan or solution.

Hypothesis 8: *Superior managers will apply economizing principles to the process of management itself: they will engage in a particular managerial process only when it is essential, and then will carry it out with the least cost and effort that will lead to accomplishment of their objectives.*

Those of us in farm management frequently make statements that sound like every decision a farmer makes should be preceded by careful and deliberate information gathering, analyzing, and comparing of alternatives. When one considers the time and costs involved in this deliberation, and the alternative uses of this time in the form of other decisions to be made, farm work to be done, and the desire for leisure, one is less sure that such deliberation is always in order.

Operating a farm presents a continuous stream of opportunities and demands for decision-making. Carrying out long information-gathering and analysis steps in connection with one decision may prevent a farmer from getting to the next decision; opportunities for making worthwhile changes may be passed by. Thus, I am suggesting that *quantity* as well as *quality* of decisions must be considered. Avoidance of high incidence of forced action situations is also implied.

Simon has distinguished between "programmed" decisions—those to which systematic and predetermined managerial procedures are applied, and "nonprogrammed" decisions—those to which these systematic procedures are not applied.[20] This two-way classification impresses me as being an oversimplification. What we have are different decisions which call forth a continuum in degrees of managerial effort. Some decisions may legitimately call forth deliberate time-consuming, costly managerial effort; others may legitimately be handled intuitively or by application

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[19] Modigliani, Franco, and Cohen, Kalman J., "The Significance and Use of *Ex Ante* Data," Ch. 11 in *Expectations, Uncertainty and Business Behavior, op. cit.*

[20] Simon, "Theories of Decision-Making . . . ," *op. cit.*

of rules of thumb. Where along the scale they fall may depend upon such things as (1) how complicated the problem is, (2) the size of the stakes involved—the consequences of being right or wrong, (3) the probabilities of being wrong, and (4) the extent to which the farmer has had previous experience in facing the particular kind of problem.

Some decisions a farmer makes deserve little time because the decisions are so small that the consequences of being wrong are relatively unimportant. Other decisions may involve low probabilities of making a serious error.

Considerable managerial effort can be saved if a manager develops definite procedures to follow when faced with repetitive decisions. When he faces repetitive decisions, a manager should be able to recognize immediately what the problem is, figure quickly what information is needed in light of the decision to be made, and should know where and how to go about searching for the information in a systematic manner (in his mind, files, or from sources off the farm). Similarly, he should be able to bring principles and procedures into play in analyzing relevant alternatives. And if he has a fairly clearly formulated set of goals, choice of the alternatives will be facilitated. Use of predetermined procedures will free more managerial time and energy for important, nonrepetitive decisions to which it may not be possible to apply systematic procedures.

The next hypothesis is somewhat of an extension of the last one.

Hypothesis 9: *Superior managers will use aids and services to supplement mental processes when use will result in lowering cost of carrying out managerial functions.*

Machines can handle some computations beyond the capabilities of the human mind. And some computations humans handle can be done more economically by machine. The superior manager will use aids to mental processes whenever economical. Since some of the costs and benefits will be difficult to determine in advance, the manager, as in many other things, will have to think in terms of expectations and subjective costs and benefits.

Aids may be employed in any of the managerial processes. They will be especially valuable in the process of analysis, particularly when there are a number of alternatives to be analyzed.

Some examples of simpler aids to management are the following. Farmers can use systems and devices for classifying and filing information developed by commercial farm management companies and some agricultural colleges. Use of simple arithmetic and pencil and paper rather than figuring in one's head is a valuable aid to most farmers in analyzing certain kinds of problems. Planning books and forms may be helpful in some cases. A number of farmers can profitably invest in adding machines

and perhaps desk computers. Farmers can use farm accounting and analysis services available in some States.

Although somewhat more involved, farmers could make use of a farm analysis and planning service using linear programming techniques on electronic computers. These services could be provided either by the agricultural colleges or commercial concerns. The farmer could send in his resource situation about his farm business, the kinds of alternatives he would be willing to consider, estimates of production and yield possibilities, and other information. The computations of expected outcomes of these alternatives could then be computed and sent back to the farmer. The farmer would still have the job of comparing alternatives, making judgments in relation to goals, risk, personal preferences, etc., and making decisions as to which plan he would adopt. In this manner, farmers could consider many more alternatives and variables than most are presently able to do. The alternatives could be analyzed quickly, accurately, and inexpensively.

Iowa State University reported the availability of such a service to Iowa farmers in 1956.[21] The latest issue of the *Farm Quarterly* reports the use of these techniques in actual farm situations by a commercial farm management company.[22] Loftsgard and Heady suggested recently that this type of service to farmers could be improved by applying *dynamic* linear programming techniques to individual farm *and home* units.[23]

Hypothesis 10: *Superior managers will follow up by evaluating the outcome of their decisions and actions, and develop a mental feedback system.*

Better managers will do some systematic evaluating of the outcome of their decisions and actions. Periodic stock taking may make it possible to correct errors before they get too far out of hand. Actions of management may create new and unforeseen problems which need to be dealt with. New information may be profitably incorporated in the plan. The action and experience may suggest further desirable changes that can be made. Information and experience flowing from a particular decision and action may be stored for future use.

Observation of one's own managerial processes and the outcome of one's actions may contribute to a better *system* for carrying out managerial processes in the future. The manager may learn how to better carry out information gathering, analysis, and other processes. Experience can con-

[21] Heady, Earl O., " 'Mechanical Brain' Always Finds Your Best Farm Plan," *Capper's Farmer*, Jan. 1956.

[22] Straub, Charles, "Programming for Balance," *Farm Quarterly*, Summer 1961.

[23] Loftsgard, Laurel D. and Heady, Earl O., "Application of Dynamic Programming Models for Optimum Farm and Home Plans," *J. Farm Econ.*, Vol. 41, Feb. 1959, pp. 51-62.

tribute much to the improvement of managerial processes if the manager works at making the experience pay off.

Conclusion

I have expressed considerable faith in the possibility of improving the human resource used in agriculture through the discovery and teaching of improved managerial processes to farmers.

In formulating some hypotheses regarding the improved managerial processes, I have tended to emphasize the limitations on the human mind in carrying out these processes. Within the limits of human capabilities, I have emphasized the need for applying economizing principles in carrying out managerial functions.

I recognize there will be individual differences in processes used by managers based on such things as age, experience, capabilities, personality, etc. Some may be able to perform one managerial function better and some not as well as another; thus similar outcomes may be a result of one manager performing one function and another performing a different function well. Perhaps different managerial processes should be developed for different kinds of farmers; for example, for farmers of different capabilities or personalities.

Now that we have outlined some hypotheses, where do we go from here? I would say that if a farm management teacher or extension worker considers any of the processes suggested in these hypotheses as already having sufficient basis (or that they appear sufficiently plausible without further proof), they could accept and proceed to work out methods of teaching them to actual or prospective farm managers.

Empirical testing is worth considering for some of the hypotheses.[24]

In testing these and other hypotheses regarding improved managerial processes, we stand a chance of discovering processes which, even if not "ideal," may be superior to those presently used by many farmers. And empirical testing is apt to make two additional contributions: (1) we may learn more about the actual behavior of farm managers and (2) we may discover needed modifications in our existing body of managerial theory.

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[24] I suspect that some of the hypotheses will be subject to testing through empirical research with farmers, and some will not. If one attempts to test these or any other hypotheses regarding improved managerial processes by relating the processes used to measures of success or outcome (such as net farm earnings or net worth) at least two difficulties will arise, in addition to important measurement problems. First, outcome will be influenced by external events such as weather, availability of resources, etc., as well as the managerial effort. Secondly, there will likely be such large variances in the relationships between the processes used and the measure of success that the results are not likely to be statistically significant at commonly accepted levels of significance. In saying this, I do not mean to imply that statistical evidence is the only kind of proof of a hypothesis.

DISCUSSION: IMPROVED MANAGERIAL PROCESSES FOR FARMERS

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In discussing Professor Nielson's paper on improved managerial processes for farmers, I will not attempt to make refinements in his theoretical explorations of the subject. I wish to point out where these explorations may be incomplete and to indicate where farm management research may be needed to improve the managerial processes of farmers.

I need to make three assumptions regarding improvement of managerial processes in agriculture after reading Professor Nielson's paper: (a) If farmers use the managerial processes set forth in his model, the management input in agriculture would result in greater satisfactions, increased returns, or a higher level of attainment of farm family goals. The result would be an improvement over the accomplishments of some current status of the managerial processes employed by farmers. (b) An objective of the university, the Extension Service, or the general public is to direct efforts toward improving the managerial processes employed by farmers. (c) It is important that research be conducted to explore the managerial processes, *per se*, and to test for significant differences in the accomplishments of farmers who practice a rational managerial process and farmers who employ some inferior technique of decision making.

If we are to move in the direction of these three assumptions about the managerial processes in agriculture, it is necessary that we have an explicit statement of what constitutes the improved managerial process. Professor Nielson has very ably set forth a managerial process model to serve as a framework for empirical research and public education. He then proceeds to formulate 10 hypotheses which characterize the manager in respect to various parts of the managerial process model.

I find no disagreement with Professor Nielson in regard to his eight managerial processes. They are consistent with other models set forth in the literature. Not all models of the managerial process include his processes in regard to goal formulation, recognition of the problem, and revaluation of the results, but his arguments seem to justify including these processes.

Professor Nielson states that his 10 hypotheses may or may not be subjected to empirical testing. It is my opinion that before any of these hypotheses can be empirically tested, we must find a method of distinguishing between a superior and an inferior manager. We will be confronted with the traditional problem of measuring the management

factor in agriculture. Rieck[1] has attempted to make an empirical measure of decision-making as an evaluation of Farm and Home Development in Wisconsin. He found significant differences between those who had participated in the Farm and Home Development Program and a group who had not participated. After developing a criteria of indicators of managerial ability, he also concluded that if empirical research is to continue in this area, there must be more precise measurement of the decision-making ability of individual farmers. Professor Nielson's 10 hypotheses might offer direction in overcoming this difficulty in farm management research.

In the first two hypotheses, Professor Nielson makes no reference to the "superior manager" and calls them behavioral rather than normative. The behavioral hypotheses seem to be the most difficult to follow in the paper because they are general and have not been associated with a specific level of managerial ability as in the case of the normative hypotheses. The normative hypotheses apply to a superior level of management which provides a basis for subjecting them to empirical testing, whereas this basis for empirical testing seems to be lacking in the behavioral hypotheses. Furthermore, the two hypotheses seem difficult to follow because the first postulates a positive effect and the second postulates a negative effect upon the managerial process. There appears to be considerable intermingling of the behavioral characteristics described in these hypotheses to have such opposite influences.

We must agree with the author that we have evidence of the behavioral influences when we see farmers confronted with the problems of resolving the inconsistencies between objectives as individuals and objectives as members of society, justifying policy of farm organizations, and being confronted with poor advise from their extension agent. If Professor Nielson's hypotheses are to be tested, we would need to know if he proposes to test for the existence of conflict and cognitive processes or to test for influence of the behavioral characteristics as inputs to the managerial processes.

As the hypotheses develop in the paper, I am left with the impression that the "superior manager" moves to a higher level of intellectual competence in his processes. Most farm management specialists will agree that we have varying groups of individuals when we attempt to evaluate their management ability. One group (which may still be very large in agriculture) has a level of management skills where a large improvement

[1] Rieck, Robert E., *An Empirical Measure of Decision Making as An Evaluation of Farm and Home Development in Wisconsin*, Unpublished Ph.D. Thesis, Univ. of Wis., 1960.

can be achieved with a small amount of education and guidance through a specialized program such as the Farm and Home Development Program. On the other hand, we may have a group where further education and guidance programs would not improve the decision-making techniques.

If we are attempting to improve the managerial processes of farmers, it appears that some individuals could develop their skills to the level of the "superior manager" characterized by all eight hypotheses, but others could reach the proficiency of the "superior manager" characterized by only a few of the hypotheses. Each hypothesis has its own definition of the "superior manager." It would be helpful to the extension specialist if he knew where to place the most emphasis when be begins devoting his time to improving the managerial processes of farmers. This would require some ordering of Professor Nielson's hypotheses.

It might have been helpful if Professor Nielson would have proposed a hypothesis which dealt specifically with the influence of teaching and education upon superior managers. More information is needed about how individuals respond to teaching of management principles if improvement is to be obtained in the managerial processes in agriculture. It is possible that research would indicate that management processes should be taught to those who come in contact with farmers rather than directly to the farmers. The fertilizer dealer, the banker, the Production Credit Association fieldman, or the vocational agriculture instructor may need to know how to employ managerial processes.

Professor Nielson has developed a challenging set of hypotheses in the field of farm management which will encourage further research and study of the managerial processes in agriculture. The paper has emphasized the difficulty in developing a set of hypotheses that are adequately refined enough to submit to empirical testing. Also, his paper has emphasized the complexity of the managerial processes when one must depart from the normative approach in management research. Professor Nielson should be encouraged to continue his efforts in this difficult task.

THE MANAGEMENT RESOURCE AND AGRICULTURAL MARKETING

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I DEFINE management in the Marshallian utility concept. Thus, I like Simon's tendency to make it synonymous with "decision-making."[1] I honor such definitions as "management is the decision and control of resource allocation," "management involves decisions on how resources will be used between alternatives at a given point of time and between alternatives over time," or "management may be considered as synonymous with planning and coordination." But the straightforward idea of putting the whole thing up to the buzz saw of decision appeals to my practical approach.

A thread of continuity has forced classification and priority into modern definitions of management. This gives them much needed utility. Number of classes in these verbal hierarchies varies, but the effect is the same. Traditionalists have classified with planning and control; they had trouble with priority. John R. Commons with institutionalism set the stage for functionalism in management. We get classifications such as strategic, semi-strategic, and routine decisions from writers like Ashby[2] and Alderson.[3] Such concepts elevate the comptroller function and modern mathematical approaches. Simon[4] has gone modern and effectively used "programed" and "nonprogramed" to sort among decisions and to build a detailed case for establishing priority.

This type of management has a long history, rather well recorded.[5] To be trite, it is merely another portrayal of a phase of modern life being moved from an art toward a science. A body of knowledge is being constructed; tools are accumulating. Permit me some broad liberites, with a bit of history.

Early business history found management a one-man show—a man with wide experience from "coming up through the ranks." Smaller businesses dominated, often with subsistence the goal. Management reward was for the art of making the right decision in a majority of the situations at the right time. If the manager made the right "what" decision, his "how" decisions weren't crucial.

[1] Simon, H. A., *The New Science of Management Decision* (New York: Harper and Brothers), 1960, p. 1.
[2] Ashby, W. R., *Design for a Brain* (New York: John Wiley and Sons, Inc.), 1952.
[3] Alderson, W., *Marketing Behavior and Executive Action* (Homewood, Ill.: Richard D. Irwin, Inc.),
[4] Simon, *op. cit.*, p. 5.
[5] For instance, Merrill, H. F., *Classics in Management* (New York: American Management Assn.), 1960.

The Industrial Revolution fostered cost reductions. Managers with cost-reducing patents rose. Kraft, Borden, Swift, and Kellogg were imprinted on the pages of management history. But industrial patents were soon to be buttressed with economics, and economics came forth as a prominent tool of management made manifest in general accounting. Inventory of resources was formalized by the balance sheet; economic growth by the income statement; and operating procedures by the budget. A basis for science was appearing. Cost accounting refined this new science.

Operations planning, control, and improvement were then subjected to the scientific approach of so-called industrial management. The father, Frederick Taylor, bore principles of management which still stand. Engineering thus gained entry. Taylor held that science could come to all phases of management including scientific selection and training of people, as well as scientific relations of workers to management and to each other.

Engineering and economics tended to develop a management science, but a piecemeal one. Mathematics and statistics along with high-speed calculators are today welding this piecemeal pattern into an over-all science of management. Such development parallels scientific automation of production and distribution.

Scientific management does not displace the manager. In fact, its fastest growing aspect is science of the manager himself—the so-called behavioral sciences. A major thrill of the future is its promise to integrate managers into management science.

The Uncomfortable Theorist

Boulding makes the point that the traditional firm theorist has a short tradition.[6] That classical economists should focus on the market system was logical; competition was to whip the individual firms in line. Businessmen have never embarrassed the classical theorist more thoroughly than by their tradition of making money while seemingly ignoring the marginal analysis. The Chamberlain-Robinson Revolution made more sense to the businessman, but some of the things said this time embarrassed him. Abbott and others have added some salve, but the facts are that a theorist in business management has usually been uncomfortable.

Cleland[7] says the theorist will remain uncomfortable unless he realizes that management is a positive force. Thus, the theorist must get inside

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[6] Boulding, K. E. and Spivey, W. A., *Linear Programming and the Theory of the Firm* (New York: The Macmillan Co.), 1960, Ch. 1.

[7] Cleland, S., "A Short Essay on a Management Theory of the Firm," *Linear Programming and the Theory of the Firm* (Boulding, K. E., and Spivey, W. A., New York: The Macmillan Co.), 1960, Ch. 7.

the internal organization and consider the fact that administrative authority may act as an alternative to the market mechanism. Hopefully this will continue to come through the metamorphosis of Jacob Viner's skills concept, so amply buttressed by Boulding,[8] toward the goals of a well-rounded theory of management. In fact, this metamorphosis may be approaching a climax as inferred by the work of Leavitt and Whisler,[9] Newell, Shaw and Simon,[10] and others.

The agricultural marketing theorist has had a grace period. First, many agriculturally related industries have lacked the concentration necessary to make traditional firm theory inappropriate. Second, the farm management bias of many marketing workers has focused their attention on the firm analysis rather than market system analysis. Moreover, conventional marketing problems have been couched in the price-making complex for which market system analysis has been helpful. Also, the agricultural marketing profession is new and an old tradition in firm theory was not necessary.

This grace period is about over. Concentration studies of several years ago, now buttressed on every side, suggest we heed the warning of Cleland. Farris[11] strongly urged in 1956 that we classify our marketing structures so as to focus appropriate tools on appropriate problems.

Businessman and theorist both respect Dewey[12] who set out the three classical, closely related, stages of problem solving as:

1. What is the problem?
2. What are the alternatives?
3. Which alternative is best?

Simon adapted these to decision-making and called them, respectively, the intelligence, the design, and the choice activity.[13] Such terminology fits the modern twist with emphasis on improved information, activity programing, and basic choice indicators. It is held that these activities involve skills "as learnable and trainable as the skills involved in driving, recovering, and putting a golf ball." Moreover, this philosophy cuts across both programed and nonprogramed decisions. Not only the concepts but also the terminology of the current theorist is being promoted by the businessman, even with an assist from the military. This theorist has now become so comfortable that his comfort now makes him uncomfortable!

[8] Boulding, K. E., *The Skills of the Economist* (Cleveland: Howard Allen, Inc.) 1958.

[9] Leavitt, H. J., and Whisler, T. L., "Management in the 1980's," *Harvard Business Review*, Vol. 36, No. 6 (Nov.-Dec. 1958), pp. 41-48.

[10] Newell, A., Shaw, J. C., and Simon, H. A., "A General Problem Solving Program for a Computer," *Computers and Automation*, Vol. 8, July 1959, pp. 10-17.

[11] Farris, P. L., "Marketing Extension and Competitive Structure," *J. Farm. Econ.*, May 1956, pp. 597-602.

[12] Dewey, J., *How We Think* (New York: D. C. Heath and Co.), 1910, Ch. 8.

[13] Simon, *op. cit.*, p. 2.

Baumol[14] wrote a book developing this spirit as stated: "The last few years have brought with them a happy increase in rapport between the economic theorist and the managerial economist. This development has involved their simultaneous realization that business practice can be a fertile source of more abstract analytical ideas and the theorist's rigorous tools can make an important contribution to the analysis of applied problems."

The Decision-Making Complex

Simon has illustrated well the traditional and modern techniques that go with the programed and nonprogramed decisions of his formulation (Table 1).

TABLE 1. TRADITIONAL AND MODERN TECHNIQUES OF DECISION-MAKING

Types of Decisions	Decision-Making Techniques	
	Traditional	Modern
Programed: Routine, repetitive decisions Organization develops specific processes for handling them	1. Habit 2. Clerical routine: Standard operating procedures 3. Organization structure: Common expectations A system of subgoals Well-defined informational channels	1. Operations Research: Mathematical analysis Models Computer simulation 2. Electronic data processing
Nonprogramed: One-shot, ill-structured novel, policy decisions Handled by general problem-solving processes	1. Judgment, intuition, and creativity 2. Rules of thumb 3. Selection and training of executives	Heuristic problem-solving techniques applied to: (a) training human decision makers (b) constructing heuristic computer programs

SOURCE: Simon, H. A., *The New Science of Management Decision*, (New York: Harper and Brothers) 1960, p. 8.

The programed group in agricultural marketing is being tackled and work is moving rather well.[15] Operations research is part of most major research programs in agricultural marketing. We have some work on the place of electronic data processing and the food industry has increased research activity in this area materially within the last year. Unfortunately mechanization is the scope of thought of too many food industry managers in this field.

[14] Baumol, W. J., *Economic Theory and Operations Analysis* (Englewood Cliffs, N.J.: Prentice Hall, Inc.), 1961.

[15] French, C. E., Snodgrass, M. M., and Snyder, J. C., "Application of Operations Research in Farm Operations and Agricultural Marketing," *Journal of Operations Res.*, Sept.-Oct. 1958, pp. 766-775.

Potential savings from applied research and extension in this area is great. Merely shedding top management of the routine here would mean much. Sixty-four dairy plant managers spent 53 percent of their time on decisions that would not affect the firm for more than one week.[16] Reynolds[17] found that supermarket managers perform 23 routine functions, 14 semi-strategic functions, and only 10 strategic functions. Much work on mechanization of routine decisions is needed. Tentative analysis shows that current mechanization alternatives in data processing often break even on a straight labor-capital substitution basis. This suggests the great potential for these machines to aid decision making directly. A broad frontal attack must be made to take advantgae of the low marginal cost for performing these activities.

Let me emphasize only two operations research techniques—linear programing and simulation. The first illustrates the broad field of mathematical formulation; the second a family of techniques in applied statistics. These are currently the most promising fields of operations research in agricultural marketing.

Linear programing has already shown its mettle. However, two recent developments deserve mention. Snyder[18] and others have put price making as well as price taking concepts within these models. Thus we have put back into demand and supply schedules the slope, so conspicuous by its absence in most marketing work using these techniques to date. Recent work such as that by Gomory,[19] Dantzig,[20] and Peart, *et al.*[21] on integer solutions allows the economist to go back to traditional cost accounting concepts of fixed and variable costs, so rudely taken away by assumptions of traditional linear programing. This could be the most fundamental change in mathematical formulation of economic problems since the simplex method.

Simulation must be mentioned in approaching programed decisions by applied statistics. We recently worked on such a planning problem in

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[16] Hood, R. W., "An Evaluation of the Economics of Product Selection Problems for Multi-product Fluid Milk Plants" (Unpublished Ph.D. Thesis) Purdue Univ., Jan. 1960.

[17] Reynolds, J. W., "An Evaluation of the Rate and Performance of Selected Owner-managers of Affiliated Indiana Retail Food Stores in Indiana" (Unpublished Ph.D. Thesis) Purdue Univ., Jan. 1962.

[18] Snyder, J. C., "Management Models of Mathematical Programing" (Unpublished Ph.D. Thesis) Purdue Univ., Jan. 1962.

[19] Gomory, R. E., "All-integer Integer Programming Algorithm," Res. Rep. RC-189, IBM Corp. Research Center, Yorktown Heights, N.Y., Jan. 29, 1960.

[20] Dantzig, G. B., Discrite-variable Extremum Problems, *Journal of Operations Res.*, Vol. 5, 1957, pp. 266-277.

[21] Peart, R. M., Isaacs, G. W., and French, C. E., "Optimizing Materials Handling Systems by Mathematical Programing," Paper 60-804, American Society of Agricultural Engineers, Dec. 4-7, 1960.

a cheese manufacturing plant.[22] In this study Monte Carlo techniques were used so management could plan taking into consideration the extreme situations that can occur as a result of probabilistic milk arrivals. This simulation of milk arrivals allowed management to plan in advance the labor requirements for cheese room operations. Results of various milk purchasing policies were also tested as well as efficiency of labor utilization under various policies.

Traditional analysis has not been able to incorporate explicitly into most models the stochastic characteristics of environmental factors playing on a management decision. In most analysis, especially in the so-called economic-engineering approaches, case studies, before-and-after illustrations, or replications were necessary to test the synthesis under operating conditions. Attempts to develop short cuts to gain the advantage of experience have been many; formal education has not been the least of these. Simulation through computers gives a promising approach most appealing to an economist.

This discussion may have overemphasized operations research but operations research is the basic modern development in this programed decision area. Miller and Starr[23] defined operations research as "a continuum of methods resulting from a fundamental program of model building within the decision theory framework."

Nonprogramed decisions may provide the most lucrative area of exploration for the young agricultural marketeer—stakes are high and state of arts low. Agricultural marketing firms, as well as industry firms in general, seem to have awakened recently to long range planning as have agricultural marketing researchers.[24] Yet this area has been traditionally, and is for the most part currently, an art based upon that elusive management quality of judgment. The work of Reynolds in supermarkets and the recent study by Milliken and the author[25] in fluid milk plants illustrate that management is cognizant of this type of decision, even if their approach to it leaves something to be desired.

Training in problem formulation and solving has increasingly been emphasized in resident and adult teaching by agricultural economists. Probably such traditional emphasis will continue to be our major attack on this area. Undoubtedly the developing management climate will give such training more opportunity for fruition. But skills for this type of

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[22] Glickstein, A., "The Development of an Integrated Production Control System Through Simulation Procedures" (Unpublished Ph.D. Thesis), Purdue Univ., Jan. 1960.

[23] Miller, G. W. and Starr, M. K., *Executive Decision and Operations Research* (Englewood Cliffs, N.J.: Prentice-Hall, Inc.), 1960.

[24] Bock, R. H., *et al.*, "Long Range Planning for Agricultural Marketing Firms," Purdue Univ. M.P., March 1960.

[25] Milliken, D. B. and French, C. E. (Publication in progress).

decision do not have the build-in floor of a safe margin such as the programed decision does. Programed decisions have safety in an underpinning of rather simple psychological factors establishing habits. Unfortunately the psychological aspects of judgment are less understood and presumably more difficult.

Selection of personnel with high level skills in such problem solving has been an approach much underused in our field. Some agricultural firms are known to be borrowing from work such as that of McCormick, Blanchard, and Thomas[26] in farm production. Opportunity for much greater use of these selection techniques exists. Various studies such as that by Hood have shown that top management could free more time from programed decisions for non-programed ones. This is probably the most appropriate source of relief for this problem in the short run. Mechanization can do much here at low marginal cost.

In the longer run, we in agriculture must experiment with the modern heuristic problem solving techniques.[27] This intriguing work of studying how people make decisions by techniques using tape recorders and such devices suggests a whole series of approaches running analogous to what modern thought gives in consumer reaction. My bias suggests that exploration on the management decision area of production may have greater reward than such exploration in the consumption end. Yet, I applaud the work there as well.

Studies on how management makes decisions such as we have made merely by asking managers why they do what they do have been helpful. But the psychologists have cautioned us sternly about asking consumers "why." Let us use this lesson in production management analysis. Computer language is not as far advanced as some of its proponents claim, but it is moving fast. Mechanization in this area seems limited only by how fast the brain can tell the computer how the brain should be imitated. Agricultural marketing researchers have the responsibility to be conversant with the computer as a technique of research in this sense, as contrasted to viewing it merely as a machine for data processing.

Incidentally, a test of the rationality assumptions we so glibly use for describing both consumer and producer managers may be necessary in order to free us for objective research in these fields. Also, it is interesting to speculate on what we may uncover in the area of risk and uncertainty. Discovery is yet a major part of this field. Its existence has generally been shrouded by the traditional theory assumptions. It is a paradox that controls in the agricultural field have become a reality at the very time we try to escape using such controls by using more complicated techniques.

[26] McCormick, E. J., Blanchard, R. E., and Thomas, D. W., "An Objective Method of Selecting Farm Tenants," Purdue Univ. Res. Bul. 678, April 1959.

[27] Newell, *op. cit.* and Simon, *op. cit.*

The Wedding

To delineate the basic components of the management problem, modern literature has emphasized classification and priority. I have used it in my analytical model. Now, let me say that this useful approach runs a risk of eclipsing the most basic need in management today, especially in the agricultural area. We need a capacious concept of management. Today senses the interlocking of science. Our diversion of current thinking to emphasize divisions of management is paradoxical in its usefulness. Where we in agricultural economics go so unbridled in our subject matter as to risk losing our profession, we need this embracing concept of management. Thus, where I split the field for emphasis, I try now to wed it for effectiveness and direction. All classifications proposed are for convenience; the decisions actually form a continuum. The techniques and skills can be specialized, but their general utility in this area should be of greater concern to the student of management.

Information has come to the fore as the basic ingredient of this general approach. With enough information we can tie a programed decision to an unprogramed one. Planning feeds on control and vice versa. The feed back principle is a part of our age. Information theory in its broadest perspective encompasses so much more than seen by the traditional economic analyst begging for more coefficients so he can use an established model; more than seen by the risk-and-uncertainty analyst trying only to decide which items are insurable; more than seen by the structural analyst trying to break down a theoretical assumption of the classicalist; and more than seen by the top manager wanting to know where he has been. Ironically, the broad prospective has in many agricultural firms now placed the top manager in the shadow of his comptroller, whom top management considered only a necessary evil.

The agricultural manager needs relevant information—facts to be taken, not given. Information for decision making is rather complicated with several components (Figure 1). The most typical management problem deals with alternative sources of raw materials convertible by alternative processes into alternative products at varying rates. Moreover, these alternatives are subject to various limited operating facilities and usually limited market outlets or supply sources. The alternative raw materials, products, and processes have varying costs or values usually denoted by prices. A complicated set of relationships combine these many factors. Usually the objective is to choose a set of alternatives which will maximize profits.

The unshaded area (Specified Relationships) in Figure 1 represents the basic data mandatory for use by an up-to-date manager. Basically, these are operational in nature, essentially devoid of traditional economics.

They are power requirements, machine speeds, product formulas, storage requirements, package size, and a myriad of such other data necessary to run a business.

The shaded areas tend to involve planning and control—items essentially managerial or economic in nature. These items tend to be stock in concept, often fixed over time and limiting in nature. These involve decisions of choice, especially in the long run. Labor qualities, machine capacities, market limits, and many other factors make up this group.

To focus attention on a piece of hardware and to say that it alters

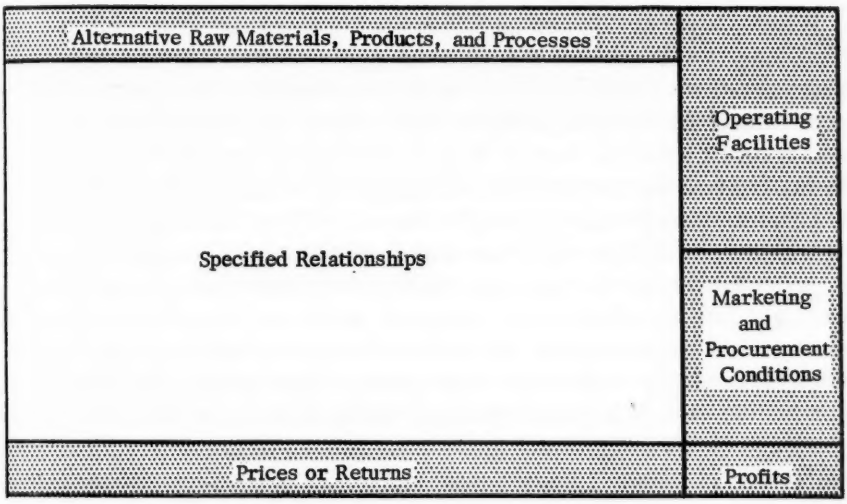

FIGURE 1. THE COMPLEX OF INFORMATION NEEDS IN A TYPICAL AGRICULTURAL MARKETING FIRM.

seriously the main stream of economic concept goes against the grain of any social scientist, let alone an economist. But the digital computer has diverted attention from professional partisanism. One may ignore a commercial voice such as that of Ralph J. Cordiner of General Electric who said, "When the history of our age is written, I think it will record three profoundly technological developments: nuclear energy which tremendously increases the amount of *energy* available to do the world's work; automation, which greatly increases man's ability to use *tools;* and computers which multiply man's ability to do *mental work.* Some of our engineers believe that of these three, the computer will bring the greatest benefit to man." But realization that actual synthesis of thinking processes which parallel closely some thinking processes of humans is another thing. Professional research claims that "The potentialities of a computer for flexible and adaptive cognitive response to a task environ-

ment are no narrower and no wider than the potentialities of a human"[28] do not go unheeded.

The computer will never be anything more than a machine, but an astounding machine it is. Humans will control computers, but complexity is a sign of our time. Unraveling of management complexes takes energy —humans are poor sources of energy (approximately equivalent to a light bulb). Computers can be programed to ease the burden of management at many practical levels of decision and degrees of analytical sophistication. The mechanization process will tend to span this scale and cement widely diverted parts of the complex.

Writers such as Pfiffner and Sherwood[29] emphasize the unfortunate clustering at the poles of management approaches as they grapple with administrative organization. The need for a wedding has a practical ring. Agricultural firm people are not ready to absorb the output of the modern management scientist, even if such a scientist has approached in a professional sense the comfortable setting I pictured earlier. The crying need is for management-oriented people who are well enough acquainted with quantitative technique and automation in the broad perspective to interpret directly this promise and challenge for management. Our people were the last to industrialize; many are small; and they lack traditional management sophistication. We seek to blend an optimum mix from these modern concepts, traditional management approaches, and economic theory. We seek to fashion a positive management approach. This is the challenge of those interested in the management resource in agricultural marketing.

[28] Simon, *op. cit.*, p. 24.

[29] Pfiffner, J. M. and Sherwood, F. P., *Administrative Organization* (Englewood Cliffs, N.J.: Prentice-Hall, Inc.), 1960.

DISCUSSION: THE MANAGEMENT RESOURCE AND AGRICULTURAL MARKETING

ALLEN B. RICHARDS
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Professor French has presented an interesting review of modern tools and techniques for aiding business management, presumably in agricultural marketing firms. He has defined management as synonymous with decision-making in Simonian terms; reviewed the growth of scientific decision-making in business; discussed at some length the current tools and techniques available for enhancing the quality of decisions; concluded that at present the real need is for extension personnel (using the term loosely and broadly) to bridge the gap between theorist and management; and finally left us with a challenge to develop a positive man-

agement approach. I am not at all sure, however, that he has told us much about management as a "resource." Assuming that management is decision-making, I would not agree that integer and heuristic programming, stochastic processes, and information theory are in fact decision-making; rather they are tools and techniques for aiding it. Thus, we are left somewhat in the dark as to how management is to be used within the firm; the critical areas needing improved decision-making; and other facets of management resource allocation within the firm. I am even less sure of how all this fits into agricultural marketing. Admittedly, agricultural firms need the same level of management and type of analyses as others, but more explicit reference to agriculture would have been helpful.

There are a number of minor points that bother me. However, I shall review only two of these, the importance of which are more related to my personal biases than to their likely importance in the over-all setting of the paper.

The first relates to accounting. Professor French states that economics was introduced to business management through general accounting. Although I agree that accounting and economics are interrelated, it is stretching the point to suggest that financial accounting is the manifestation of economic theory in the business world. Clark and Canning, and more recently, Wheeler, Jaedicke, Bierman, and others have pointed up the significant differences between many areas of economic theory and accounting. Boulding even tried to reformulate firm theory in terms of accounting concepts. Moreover, financial accounting predates firm theory. The fundamentals of double-entry bookkeeping originated in the 14th and 15th centuries and have changed little, if at all, since then.

Professor French further states that integer programming takes the economist back to traditional cost accounting concepts of fixed and variable costs. Traditional cost accounting concepts, however, have not separated costs into fixed and variable elements, but into direct and indirect elements. These are not necessarily the same thing. In fact, one of the difficulties with conventional cost accounting is that the *indirect* category is a composite of different types of costs.

Secondly, I am rather dubious about the implied concept of agricultural marketing research. Professor French states that "Operations research is part of most major research programs in agricultural marketing." This may be consistent with the very broad and encompassing definition of operations research quoted from Miller and Starr. However, it seems to include too much. Operations research, as usually conceived (and by this I mean the impression one would get by reviewing published operations research studies), is very definitely firm or micro-unit oriented. Surely all of agricultural marketing is not micro-oriented. In fact, traditional marketing research in many Land Grant institutions has not been

so oriented. Futures trading, commodity standards, marketing orders and agreements, transportation, and other facets of marketing are not specifically concerned with individual firms. Moreover, subsuming all of mathematics, statistics, economics, physics, psychology, etc., under the title of operations reserch may be fashionable, but is hardly meaningful. Unless we assume operations research is all inclusive, I cannot agree that operations research is part of most major research programs in agricultural marketing. Indeed, some agricultural market researchers are hardly aware of the concept, yet I am sure they are providing sound analysis of agricultural marketing problems. Perhaps we can go further with such techniques than without them, but they certainly do not preclude the usefulness of more "conventional methods."

Turing now to other aspects, Professor French has succeeded in bringing out two important points:

(1) The vital role of the extension economist (again this is used in a broad sense) in bridging the gap between theorist and management.

(2) The necessity for agricultural firms to adopt advanced techniques to aid decision-making.

As the world grows more complex and advanced techniques are employed in marketing research, there is a growing necessity for a communicative bridge between the researcher and the user of that research. I am aware of one operations research group that was fired because it failed to come down out of the lofty tower of theory and obtain results that could be used by management. I am aware of another operations research group that is so out-of-phase with the business environment that it too is in danger of losing its position. Moreover, research in agricultural economics frequently accomplishes little but the enhancement of the professional standing of the author(s). Research of any kind will never benefit anyone unless it is translated into terms understandable to those using the results of that research. I fully agree with Professor French that there is a need for people who understand both management problems in a management context and scientific techniques. The extension economist should feel very comfortable in his increasingly important role.

The second important point so well emphasized by Professor French, both implicitly and explicitly, is the necessity for agricultural firms to avail themselves of advanced techniques of analysis to keep pace in the changing world. That management which does not do so voluntarily may be forced to by competition. This is particularly pertinent to managers in small marketing firms and agricultural cooperatives. Unless they heed the warning and take a progressive view, they may soon find that others have captured their markets.

Many large firms already are taking more progressive views and are allowing scientific techniques to aid them in making decisions. The work

General Mills has been doing in this area is an example. Three years ago the company established a computer program to measure the effectiveness of its advertising for ready-to-eat cereals. The model was crude, but gave useful results. For some time the company has had a computer program which indicates the minimum cost production and distribution pattern for 40 grocery products made on 15 types of production systems, and distributed through 4 regional warehouses to 40 sales districts. Production scheduling, inventory, and facilities planning studies have been made by the operations research group and are effectively aiding management.

Agricultural marketing researchers face not only the challenge of a positive management approach but, more importantly, the challenge of getting research into action, the challenge of communicating to management in management terms how research and decision-making techniques can help them. I am sure that once management fully understands the capabilities of these techniques, it will be only too willing to adopt them.

TEACHING MANAGERS HOW TO IMPROVE THEIR DECISION-MAKING PROCESSES

STEPHEN J. BRANNEN
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This paper attempts to bring into focus some concepts and techniques which experience indicates may be helpful in overcoming problems encountered in teaching managers or in teaching the application of economics in decision making. I have drawn primarily from my own experiences in informal learning situations. Also, I have surmised that the economist's concern for teaching managers is a product of his interest in teaching economics to them.

MANY problems encountered in trying to improve the facility with which economic precepts are used in decision making stem from the nature of people themselves, and the economist-teacher is among these people.

Along with the ability to laugh, the ability to make decisions—and in so doing to project thoughts into the future—is relegated only to the human animal. The decision-making process is carried on within the depths of the human mind. It is subjected to the emotional as well as the logical characteristics of each individual.

The inept application of the virtues of economics that we witness is due in part to our lack of understanding of the human resource and the strategic role it plays in bringing to fruition the efforts we devote to the discovery, isolation, and refinement of economic principles. Also, it may reflect: (1) mankind's aversion to the labor of thinking and (2) the preponderance of efforts to reduce economics to a science of cardinal values. The two are not mutually exclusive. The latter is derived from the former, even by economists, and may be primarily institutional or academic in character. Furthermore, some of the general aversion to "economic thinking" stems from experiences with economics and economists. These human traits, however, are the object of teaching.

I believe, therefore, that greater appreciation for and understanding of the human resource and the nature and character of its decision-making process are essential for the development of mental attitudes and concepts that will enable us to create more effective learning situations for managers.

The Nature and Character of Decision-Making

The human resource, with its power to reason, has the responsibility for making decisions regarding use of resources it owns or controls.

In any business, whether it is a farm, a factory, a feed store, or an

auction barn, the manager has the responsibility for making decisions that are compatible with the growth and progress of the firm. The success of the business depends on the skill of the operator in performing this key function.

Decision-making is the "heart" of management. The necessity for decision-making grows out of the alternative choices confronting management. This choice-making involves primarily mental activity. The stress and strain of the uncertainty under which decisions have to be made can lead to sleeplessness. Yet choices must be made and even the "decision to make a decision" requires the positive exercise of judgment.

Since decision-making is primarily a mental exercise, each choice that results is conditioned by the attitudes, values, and goals of the choice-maker. These differences in individuals, along with individual variations in decision-making skill, further condition the decision or "correct choice." It is important that the teacher recognize these differences. Different choice-makers may arrive at different conclusions from essentially the same information and by employing the same choice-making techniques. Perhaps this is as it should be. Different conclusions might be appropriate for these different individuals; the fact that they are different is less important than the precision of the process used in reaching a conclusion.

Systematic Decision-Making Is a Continuous Mental Process

The reference to decision making as a *process* implies that there are concomitant functions of the mind in making a decision. These mental functions may be performed simultaneously rather than in sequence. While the order may be of some signifiance, I think conscious performance of each element in the process is the important point in trying to design teaching exercises. Moreover, the instructor should recognize these functions are the purpose of his teaching even though he finds it desirable to camouflage his intent by seemingly teaching managers how to reach a given conclusion from a specified set of circumstances.

The concept of *continuity* recognizes that the need for decision-making never ceases. This too should be consciously taught. When one decision is implemented, the results it produces are immediately reflected in a new situation that offers new choices. They become a part of the facts or information relevant in making other decisions. Some other facts or expectations may be carried into the subsequent decision-making situation, though altered somewhat in magnitude or character.

Take, for example, the farmer confronted with a decision about changing the size of an enterprise. He has an objective in mind, facts that are specified, certain alternatives, and he formulates expectations regarding each alternative. On these bases he may decide to increase the size of the enterprise in question. As soon as he implements that decision, a new

set of facts specify the situation. While he may have the same general goal, the change in specified facts along with possible changes in alternatives and their expectations may dictate a choice different from the former.

This suggests that decision-making is not a "one shot" deal. Some decision of some kind and magnitude is being made all the time. It seems important then that this continuous aspect of decision-making be recognized and its implications included in approaches to teaching. Otherwise, the decision made, or that is to be made, may become the obvious aim of teaching.

Recognizing and Teaching Elements in the Decision-Making Process

A conceptual structure of elements in the decision-making process is helpful in developing teaching exercises. It facilitates a design in subjust matter that will require the exercise of each element in arriving at a decision.

The parts of the conceptual structure of the process as used here are referred to as elements rather than steps to avoid inferring that this is necessarily the "best" or "right" sequence.

Defining the problem

Conscious design of this element can avoid much disagreement over "the answer" when trying to teach the application of economics in decision-making. Managers generally view a problem in nontechnical terms and intermingled with the total business situation. Unless the problem is carefully delineated and emphasized, each individual sees it from his own peculiar vantage point and will consciously state it in terms of his own situation. For example, a farmer who sees the problem as "the high cost of hand labor for harvesting a crop" can react differently from the farmer who sees "field losses from mechanical harvesting" as the problem and both can miss the real purpose of a lesson on lowering the cost per unit of product.

Careful separation of the specific problem from the total problematic situation and stating it in specific terms helps overcome emotional reactions to the problem, its analysis, and solution.

Goal orientation

This and the preceding element are closely related. Problems present themselves in terms of the goals of the individual. Conscious recognition of the value framework for a problem and the decision that must be made may provide some additional insights as well as criteria for alternative evaluations. In teaching the application of economics, here is where the economic criteria are developed and many sins are committed. It is

easy for economists to implicitly assume an economic goal and proceed with an analysis and solution that is not appreciated, understood, or agreeable to their audience. Therefore, it is desirable to have the goal (economic criteria) stated explicitly and make sure it is understood. Time permitting, alternative goals may be carried through to a solution. The latter is particularly effective in driving home the point that a way of finding an answer is more important than an answer.

Recognizing alternatives

Few problems present themselves so simply that there is only one way to achieve a solution. Yet, there seems to be a general tendency for people to view them as "either-or" propositions. "Either I buy a cotton picker or quit growing cotton." "Either I put fertilizer on according to soil test recommendations or stay with my present fertilizer practice." Developing the ability to recognize additional alternatives and to eliminate irrelevant ones is an essential part of the teaching job. Including several alternatives that may be pertinent to a problem used in a teaching situation helps to emphasize the importance of this element of the decision-making process.

Recognizing and collecting needed information

Poor decisions may be the result of incomplete or inaccurate information despite the fact that much so-called teaching is really "information giving." Special emphasis should be placed upon the factual basis for decision-making and particularly for alternative comparisons. Use of a systematic approach in selecting information related to the problem, goal, and alternative will convey the usefulness of a framework for analysis in avoiding unnecessary clutter in gathering information. Facts should be differentiated from values.

This is a good place for the economist to plug records and accounts. Input-output relationships derived from them are specific to the situation of each manager.

Less resistance to the figures used is encountered when the objectivity and care with which they were selected are demonstrated. Arbitrary selection of illustrative data and "brush-off" replies to inquiries about them void the good intent of the teaching effort.

Evaluating alternatives

This element involves a careful and systematic display of the use of relevant information in formulating expectations for each of the alternatives. Implications of each alternative that cannot be quantified should be recognized and if possible ranked in terms of importance.

The subjective nature of decision-making is particularly important in this element. Judgments about the validity of future expectations must be

made. Here it is particularly important for the teacher to exercise caution to avoid imposing his values and judgments. It may be best to assume a fact-giving role and transfer the responsibility of making judgments to those whom he would teach.

Selecting an alternative

Management must assume the responsibility for the outcome of a decision. It therefore must make the final evaluation and selection of an alternative. This is a subjective function since ordinal values are usually involved and two or more alternatives may seem to be equally good. At this stage it may be necessary to obtain more information or further refine the goal or problem to select an alternative. Direction or motivation toward selection of an alternative is the teacher's role.

Making a decision in terms of a plan of action

A decision is final when expressed in action. The action program reflects the positive choice that was made. Follow-through is important from the manager's point of view and coincident decisions will be necessary for systematic achievement of the objective. Though this is the final element in the decision-making process, it deserves no greater emphasis in teaching the process than do any of the others.

Avoiding the tendency to underplay the first six functions is a problem of major proportions in teaching. Familiarity with the design of the learning exercise may cause the teacher to rush through some of the elements and over-emphasize his subject matter objective or the problem solution at the expense of the objective to improve decision-making skill. Each element of the decision-making process should be built into the learning situation and the performance of each assured in the conduct of the exercise.

Dealing With Human Tendencies

Efforts to improve the facility with which managers apply economic precepts and analytical techniques in decision-making must deal directly with man's aversion to the labor of thinking as well as with value judgments. This appears to be true whether teaching managers themselves directly or training those who have direct contacts with managers. All too often the student–farmer, or agricultural worker–seeks only the problem solution rather than a technique for determining the solution. This tendency derives in part from the mental exercise requirement of positive decision-making and partly from the preponderance on our part to provide mainly *the* general *solution*. The latter may represent a genuine desire to be of service but neglects to exercise fully the opportunity to develop the human resource.

It is imperative that the tendency to jump to "the answer" be overcome because it violates a conceptual framework for the process as a whole. Each teacher must find for himself some useful concepts about the nature of the process and relate subject matter to them.

Build student participation

Psychological involvement is necessary to insure the exercise of the mental requirements for decision-making. When participation gimmicks are used freely, learning seems to be a pleasure.

Experience indicates that a quiz, a problem, or a brainstorming session early in the learning exercise may be effective. When they are used, sufficient time should be taken to satisfy participants' initial reactions and overcome anxieties. Proficiency in subject matter and in group dynamics is essential to the teacher who would use these techniques effectively; and they should be studiously avoided by the teacher who is afraid of questions.

Use variety of teaching aids

Because of the intangible nature of decision-making and of economic principles, they are difficult to teach. Liberal use of carefully prepared and selected visuals will avoid another "dry talk" by an economist. In one training session, I witnessed the use of a flannel, a magnetic and a chalk board, a newsprint pad, a slide projector, mimeographed materials, and of course, charts. Unscheduled changes of instructors also were used with effectiveness for variety and change of pace.

However, teaching aids should not be used as a crutch. They are not substitutes for proficiency in either subject matter or educational techniques.

Use recognized problem

Specific selection of a problem that the particular group recognizes can help get them "with you." Though economic forces may be viewed with awe because they generate problems for the manager, statements about the relevant economic principles may do little to stimulate interest or get the attention of the students.

Use a recognized problem to get them into the learning situation and then proceed to induce the elements in the decision-making process as a framework for analysis and apply economic principles as tools for solving problems.

This approach requires finesse in using the tools in the economist's kit. It does help to keep them and the economist sharp.

Practice patience with an open mind

Most economists are aware of the fact that "pat" answers require "pat"

specifications. Yet, in our zeal for subject matter we can become entrapped into supplying pills rather than diagnostic techniques.

To teach managers how to improve their decision-making process, we have to be open-minded enough to accept different conclusions from different individuals and situations. Furthermore, we have to be patient enough to keep driving toward the educational goal while observing apparent ineptness on the part of those we teach.

Summary

Effective teaching of the knowledge and skills requisite for improved decision-making processes requires abilities in more than economics on the part of the economist. Of course, a broad base of proficiency in economic subject matter is essential. However, improving the facility with which managers apply economic principles and techniques in making decisions requires more than the mere transference of subject matter. Educational concepts and techniques that put handles on economic tools that managers can grasp have to be used. Skill in using those tools must be developed.

Teaching which will do that requires an educational objective expressed consciously in terms of change in individual ability to perform the functions inherent in the decision-making process. It also requires some appreciation and understanding of the nature and characteristics of that process. Finally, subject matter must be so designed that it will exercise the decision-making equipment of each individual.

DISCUSSION: TEACHING MANAGERS HOW TO IMPROVE THEIR DECISION-MAKING PROCESSES

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One can agree wholeheartedly with Mr. Brannen's suggestion that to teach managers to improve decision-making requires an understanding of managers and decision processes. We are grateful for the substantive suggestions: secure student participation and use teaching aids (though not as a crutch). However, one also is impressed with the difficulty of teaching the processes instead of supplying the answers to human beings who appear often to ". . . prefer emotion to reason and fiction to fact."[1] In any event, evidence suggests that many are willing to pay a substantial price (at least in terms of goods of this world) for the privilege of being nonrigorous in decision-making.

[1] Knight, F. H., *Freedom and Reform, Harper,* New York, 1947, p. 302.

To teach managers how to improve *decision-making* presumes also an answer to how farmers *learn*. Failure to use what is known about learning processes impairs our usefulness in decision-making research and teaching.[2] We thus limit our frame of reference with ill-founded assumptions while treating with great rigor a small phase of choice making we have elected to term decision-making. One suspects that Mr. Brannen's experience has somehow failed to show through. *In his paper* he has failed to take into account the human frailties (and strengths, too) of farm managers and has constrained his frame of reference unduly by leaving aside problems in learning.

Let me suggest the deficiencies in the paper that seem important to me. First of all, to entice someone to do something he finds distasteful requires he be shown that *not* to do it leads to results still more distasteful. Thus, the first step in teaching managers how to improve decision-making must be to show them that it is important. I suggest that this can be done in simple terms by demonstrating with case materials familiar to farmers the consequences of slip-shod decision-making. The point can then be driven home by showing that the payoff can be in terms of higher income or in a reduced requirement in resources of one kind or another.

A second step is to suggest that not all problems are equally important. It is entirely possible to waste human resources valuable in terms of alternative uses, by investigating at length the consequences of alternatives that vary little in payoffs for decision makers.

A third step is to develop alternatives in terms in which to conceive of payoff. The payoff relevant for the young farmer heavily in debt, trying meanwhile to maintain the precarious foothold he has in farming, is likely to differ markedly from the payoff relevant for the elderly farmer attempting to husband his scarce resources for a secure retirement. Both are likely to differ from the well-established farmer capable of withstanding the consequences of events that materialize on the wrong side of the expectation on which he bases his decision.

The fact that terms of payoff differ among decision-makers in no way presumes any necessary difference in ultimate goals. The interest of the young farmer in investments that grow, of the elderly farmer in returns that vary little in prospect and/or that reduce the demands on labor, and the third farmer in investments that maximize expected returns may all be consistent with any broadly conceived frame of reference common to all three. My main comment here is to suggest that the advice offered on goals and values is interesting, but not altogether helpful.

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[2] The growing rate of research publication makes this failure increasingly inexcusable. For example, see Estes, W. K., "A Descriptive Approach to the Dynamics of Choice Behavior," *Behavioral Science*, Vol. 6, No. 3, July 1961, pp. 177-184.

At one point I must confess to a degree of confusion in Mr. Brannen's paper. In "defining the problem" managers are seen generally ". . . to view the problem in nontechnical terms and intermingled with the total business situation," whereas we are advised later that ". . . careful separation of the specific problem from the total problematic situation and stating in specific terms helps overcome emotional reactions to the problem, its analysis, and its solution." It would seem that indeed management problems *are* intermingled with the total business situation and are without substance were this not so. To state a problem (identify alternatives that can be used to attain specified goals and restraints that exist on their attainment) requires specifically that the context of the problem be taken into account.

Finally, I am advised that it is a sensible procedure, pedagogically, to instruct in a context familiar to the students and in terms in which they can refer to their own experiences. The first requirement implies that the successful teacher is flexible in approach. He is prepared to enter an economic problem from any one of several directions, even though he is aware that eventually all or a large part of the farm and household may be involved in a problem seen first as a segmented one. The second requirement is a large part of the challenge faced uniquely by the extension specialist. He is supplied information on the one hand by research investigators necessarily (for sake of efficiency) bound up in the technicalities of their disciplines. On the other hand he faces information users who have neither the patience nor the resources to "translate" the usable fragments of research into terms useful in their own decisions.

To Mr. Brannen's credit, he rejects the temptation to complain of tools provided by the research investigator. Instead, like a skilled workman, he selects and adapts as required by the job at hand, doing his best with what he has. One would have apppreciated a little description of problems he meets in such an endeavor, and how he solves them in teaching managers to improve their decision-making processes.

ADJUSTING LIVESTOCK FARMS TO THE PROSPECTS OF THE 1960'S

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ADJUSTING LIVESTOCK FARMS IN THE SOUTH TO THE PROSPECTS OF THE 1960'S

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LIVESTOCK (beef and hog) farms of the 13 Southern States,[1] commonly called the South, have undergone tremendous adjustments in recent years. Compared with the 1930's, pasture acreage in the South has expanded to more than 200 from 150 million acres. Acreages of small grains, forages, and hay crops have increased. Numbers of farms reporting cattle and hogs have decreased 50 percent. On the other hand, numbers of cattle on farms increased 90 percent, while hogs and pigs increased 75 percent. Area-wise within the South, the Southwest[2] increased cattle numbers 60 percent and decreased hogs 2 percent; the Delta[3] increased cattle 131 percent and hogs 11 percent; the Southeast[4] increased cattle 116 percent and hogs 128 percent.

These increased numbers, combined with better breeding, feeding, and management, have resulted in an increase in the net production of beef of 172 percent, and in pork of 78 percent. On Jan. 1, 1961, the South had almost 30 million head[5] of all cattle, or 31 percent of the nation's total. Numbers of hogs on farms in the South have been 20 to 21 percent of the national total during the past several years.[6]

This growth of a commercial livestock industry in the South has been highly significant for the region's economy. Many farm operators used land and capital idled by government restrictions on row crops to produce livestock. Off-farm businesses related to livestock production, marketing, and processing brought additional employment and income to rural areas. Markets were established, dealers and trucking firms became

[1] Includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

[2] Includes Oklahoma and Texas.

[3] Includes Arkansas, Louisiana, and Mississippi.

[4] Includes Alabama, Florida, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, and Virginia.

[5] *Meat Animals—Farm Production, Disposition, and Income by States, 1959-60.* USDA Crop Reporting Board, Washington, D.C., April 1961.

[6] For a detailed summary of recent changes in the South's livestock economy as compared to the region's total agricultural economy, see Statistical Appendix of "Southern Agriculture: Recent Trends, Current Status, and Future Prospects." Agr. Exp. Sta., Auburn Univ., Auburn, Ala., June 1961.

more active, and processing plants grew in numbers and employed more workers.

Reasons for Past Growth

Farmers of the South expanded their livestock production in response to a substantial increase in demand for livestock products. This demand grew rapidly after 1940 as a result of both the local and national population growth and higher incomes. Expansion was possible because crop acreage was curtailed, principally through restriction on cash crops. Machinery replaced workstock, thereby releasing acreage formerly used to produce mule feed. A sizeable portion of these acres were converted to livestock use. At the same time, many workers left farms for other jobs. Farmers with large acreages established beef enterprises because they could be managed with relatively little labor. Many small farm operators moved into swine production.

Gains made in livestock production, for the most part, have been on farms that were above average in size and fertility, and generally adaptable to the use of mechanized equipment and to livestock as a replacement or supplement to cash crops. They were operated by farmers who had or could acquire adequate resources for making needed changes. Capital for investment in livestock flowed onto farms and ranches from private and Federal financial institutions and from special credit facilities provided by some State Governments. Operators of these farms were above average in managerial skills and abilities. Research and Extensioin made a large fund of knowledge available to farmers who wanted to reorganize their farms for livestock production.

Outlook for the 1960's

Since Southern farmers have increased their livestock production sharply in the last 20 to 30 years, they now supply most of the beef and 70 percent of the pork demands of the region. However, farmers market more livestock than are slaughtered in the region. Livestock products, as well as livestock, are imported into many parts of the region. By 1970, national demands for beef and pork are expected to increase 25 to 35 percent because of expected increases in population, higher incomes, and changing consumer food habits.

The South can be expected to increase numbers of both cattle and hogs during the 1960's. However, the greatest growth is likely to occur in cattle. A greater increase can be expected in net production than in numbers. Most of the growth likely will be from established farms, but some new livestock farms will be started. Some development of new pasture acreage may occur in Florida, the Black Belt, and the Delta. Restrictions on food and feed grains could lead to increased pasture acreage in the

Southwest. Pork production is expected to increase with larger grain yields and production. Corn yields for the region are now averaging near 35 bushels and could reach an average of 40 bushels by 1970. Grain sorghums show promise of developing into a major Southern feed crop.

Adjustments Needed

In many respects the livestock industry of the South has been plagued with "newness of industry." Yet, the region presently has a large productive livestock output despite its low stage of development. Resources on many farms are undeveloped or underdeveloped. As a result, high costs and low returns are obstacles for many producers.

Data available indicate that many parts of the South are presently at an economic disadvantage as compared with livestock production in other regions. Also, production in the region is at an economic disadvantage compared with major cash crops, such as citrus, vegetables, tobacco, cotton, peanuts, rice, sugar cane, and with wheat in the Southwest. Moreover, beef cattle and hogs must compete with poultry and dairy cows for the available feed supply in many Southern areas.

From a slow beginning, the South's commercial livestock industry has made tremendous improvements in productivity, efficiency, and increased incomes. Even so, the region's livestock industry is still hampered by several adverse physical and economic conditions. This includes small farms, low yields, lack of mechanization, poor-quality brood animals, insects, parasites, summer and fall droughts, and low levels of management. Individual operators can make adjustments to overcome many of these difficulties.

Adjustments in land use

Only 19 percent of all farms in the South are 220 acres or larger in size. Only 7 percent are 500 acreas or larger. Small farms are not easily consolidated into units large enough for efficient livestock production. Owners of small farms often prefer to hold their land even though they do not work it. Frequently, farms that are available for purchase are too scattered to be developed for livestock.

Individual producers must find ways to cope with the increasing scarcity of land required for expanding livestock. During the 1960's this need can be provided by reducing the acreage required for cash crops, improving yields by diverting acreages now used for crops in surplus supply, by releasing land used for workstock, and by proper use of idle land.

Ways need to be found to develop economic units out of small farms and to devise suitable arrangements for renting land. Changes in kinds of stored feeds grown would lessen the disadvantage of distance to some available lands. Clearing woodland and developing it for livestock use

on existing farms may become less expensive than purchase of additional land during the 1960's.

Adjustments in pastures and feed crops

Livestock producers of the South must meet the challenge of developing more effective programs for producing quality forages and other feeds at low costs. Better adapted grasses for providing forage in the normally dry summer and fall months are needed, or high tonnage crops need to be produced, stored, and fed during these periods. Yields and quality of grain crops and roughages must be improved. Adequate provision has to be made for accumulating sufficient feed supplies to meet any deficit period. Both beef and pork production are hampered by an inadequate supply of nutritive feeds on many farms.

Less than 8 percent of the nation's grain-fed cattle are produced in the South. Both fed cattle and pork production will likely remain limited until grain production is increased. However, some producers could use imported grain profitably. Beef production on pasture averages less than 200 pounds per acre. Research indicates that this rate could be at least doubled in most areas of the South with the adoption of presently recommended production practices. Fertilizers are widely used on cash crops, but few farmers fertilize pastures. Under present practices, too much acreage is used to carry a cow and calf.

Adjustments in mechanization

More total man-hours were spent in the South on the production of meat animals in 1959 than in 1949. However, production per man-hour increased for all commodity groups from 1949 to 1959. The greatest increases in labor efficiency were for crops, except in the Southeast. The increased productivity per man-hour for livestock and livestock products in the Southeast was greatly influenced by the tremendous gain in poultry efficiency. Generally, increases in labor efficiency in livestock production were greater in the South than for the rest of the nation from 1949 to 1959.

While most Southern livestock farms are considered mechanized, in general, they have only tractor power with plowing and cultivating equipment. Machinery for harvesting, storing, handling feed, and feeding livestock is missing from most farms. Yet, many of these tasks are well suited for mechanization and/or automation, especially modern hog production.

Adjustments in livestock quality and performance

Cattlemen of the South, especially of the Southeast, have an opportunity and a challenge to improve the present poor quality beef cattle on

farms. Adequate forage may produce little beef per acre unless cattle are good feed converters. The opporunity exists for stockers and feeders to be held for longer periods and to be finished out to higher grades—preferably Good or Choice. Many brood cows in the region are of poor quality. Usually bulls are of unknown quality. Also, many bulls that are in use are too young for breeding. Partly as a result of this, the calf crop in the region over the past 5 years averaged only 81 percent. This compares to a national average of 87 percent, and an average of 91 percent in the North Central States.

Most pork production in the South occurs as a minor farm enterprise and as a "step-child" operation. In most cases, too few sows are carried, too few pigs are saved per sow, and too much of the production is from lard-type hogs of non-descript breeding. Confinement feeding is the exception rather than the rule. However, research results indicate that as much grain is required to produce a hundredweight of pork on pasture as in confinement; thus, the pasture adds to feed costs.

Adjustments in financing

Livestock farming will require larger amounts of capital during the 1960's. However, additional capital for either current operation or investment should become available where cost-price relations appear favorable. Large-scale operators should be able to obtain financing on terms nearly as favorable as those available to any livestock-related off-farm business. More corporate farming may develop in the region but largely as family farm corporations and not as a means of obtaining outside capital. The potential advantage of vertical integration in the livestock industry, at the producer level, appears to be insignificant and not likely to occur on any wide scale.

Adjustments in labor and management

A favorable element in the development of the South's livestock industry has been the improvement in management skills, especially with beef cattle. Highly trained livestock men are now being hired to operate many cattle and hog farms and feed lots. However, most operators will continue to need to supply their own management. The 1960's will require higher levels of managerial skills than ever before. Management mistakes will have to be paid for at an earlier date than at anytime in the past. Less labor will likely be available, but labor will need to be better educated and trained than those in the past.

High production costs of beef cattle in the region are closely related to a low calf crop, season of breeding, low production per brood animal, low carrying capacity per acre of pasture, high feed costs, and low productivity per farm worker. Insects and parasites flourish in the South's

mild climate and add to production costs. However, costs can be reduced on most farms by better management, including the use of better quality animals, performance testing, better control of breeding seasons, proper feeding methods, proper disease and insect control practices, and better marketing practices. Feeding of some lightweight cattle and designing of livestock systems to fit specific farms are often needed.

Many professional swine workers of the South believe that good management is more important in the hog business than numbers of sows or of litters raised each year as long as facilities are used to best advantage. However, the usual recommended minimum per farm is 10 sows, with a minimum of 16 pigs weaned per sow per year. Even these numbers would allow swine production to be a relatively minor enterprise in terms of labor requirements under good management.

Summary and Conclusions

Taken overall, the South's livestock industry has progressed remarkably despite physical and economic obstacles. Several favorable elements underlying the past development will continue during the 1960's, provided needed adjustments are made. Basically, the 1960's will likely be a period of slow growth and a "firming up" of the production base. Much effort needs to be made to place the industry on a "firm foundation," and to make preparation for a much faster growth beyond the 1960's. Future expansion in the nation's livestock industry, especially beef cattle, during the next 30 to 40 years may need to occur largely in the South. By the year 2000, this may be the only region where land can be made available and forage can be grown for an expanded livestock industry.

The South does not appear to be automatically favored for marked expansion of livestock in the near future. Growth during the next 10 to 20 years will depend heavily upon the initiative and skill with which livestock producers respond to their opportunities and upon the effectiveness of their efforts compared with those of other producers competing for the local and national markets. Governmental programs and policies with feed grains during the 1960s may lead to lowered livestock prices and higher risks for the region. Everything considered, the South will likely continue to gain in the percentage of the nation's beef produced, and to about hold the present percentage of the nation's pork production.

During the 1960s, the more efficient and more profitable individual livestock farms in the South will have to become larger, more mechanized, more specialized, and more commercialized, and will have higher capital and managerial requirements. Despite the greater requirements for livestock production, the fact still remains that the most important discovery in a generation, not even excluding man's flight into space, has been the discovery of the South's ability to produce livestock as a

commercial enterprise. As an example of its value, cash income from livestock sales has grown from less than $500 million 30 years ago to more than $4 billion today and should approach $6 billion by the end of the 1960s.

DISCUSSION: ADJUSTING LIVESTOCK FARMS IN THE SOUTH TO THE PROSPECTS OF THE 1960'S[1]

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The major paper is largely speculative, and it appears to be a waste of time to quarrel seriously with these speculations. Rather, I prefer to add some of my own.

At the end of his paper, the analyst predicted that cash receipts from livestock sales might rise from the one-half billion dollars in 1930 and 4 billion in 1960, to 6 billion by 1970. If this is a reasonable projection, the relative contribution of livestock to the personal income of southerners would be less in 1970 than it was in 1960. In other words, at the projected level, cattle and hog production can make little contribution as a vehicle for getting southern farmers out of the low-income category.

To one whose primary concern is economic development, this is a distressing conclusion. Granting the validity of the projections, if no drastic changes take place in the cattle-hog industry, are there drastic actions that could be taken that would double or multiply four- or five-fold the contribution of cattle and hogs to the incomes of southern farmers? If there are such actions, how can we get them taken?

I venture the guess that there are such actions. Research findings are not complete or definitive enough to support this conclusion unequivocally, but are more than just suggestive. For example, Bender's economic analyses at the Arkansas station point clearly in this direction.

For my arguments, I want to separate cattle and hog feeding enterprises from the production of young animals to be fed. As for final products, a distinction needs to be made between choice and good carcasses, and those suitable largely for conversion into processed products. I assume without proof that in the United States—but especially in the South—the demand for quality cuts will grow much more rapidly than the demand for processed meat products.

Where does this leave us? Large expansions in cattle and hog production would need to be concentrated in quality carcasses, to capture future market growth, and to substitute for carcasses or animals being

[1] The writer is grateful to Arthur J. Coutu and Walter L. Fishel of N.C. State College for suggestions.

shipped into the South. I infer from Blackstone's arguments that land and climate are not unfavorable. Several problems remain to be solved, and the key to each of these seems to be better management. Let's discuss them one at a time:

1. *Genetic improvements.* Large gains in the efficiency of cattle—and to a lesser extent in hogs—are possible, but the instructions on how to achieve these gains are yet to be written. In the initial stages, the lead will be taken by good managers who build up their herds by selection until a 95 percent calf crop, weighing 450 to 600 pounds each at sale, is achieved. These calves need to be good feed converters. Record-keeping will play a substantial role in reaching these potentials. Southern livestock farmers need not only to adopt and use known technology efficiently—they need to get into the act of developing new technology. They need to lead rather than follow. Research has a very important role to play in this phase of genetic improvement.

2. *Labor efficiency.* Profitable livestock units will be large, and operator and family and hired labor need to be used very efficiently if labor requirements for livestock enterprises are not to be excessive. Labor management is an almost completely neglected factor in southern agriculture, particularly in the training aspects. Extension has an important part to play.

3. *Land arrangements.* While a great many livestock farms have too little land to be adequate units, research results almost always emphasize the greater productivity of operating capital rather than of capital invested in more land. This seems to call for the improvement of renting or leasing arrangements for the additional land needed, with scarce capital funds going into operating capital. Research shows already that 5 or 10 year leases can be made advantageous both to the owner of idle acres and to the renting farmer. More research is needed, and effective extension programs must be designed to knock down social barriers to leases suitable for livestock units.

4. *Feeding efficiency.* For feeding enterprises in the South, the risks, and the capital and management requirements, are all rather great. Vertical integration arrangements may prove to be quite useful in developing feeding enterprises. These arrangements must satisfy two or three restrictions. The meat packer can profit from arrangements that will assure him a steady flow of quality animals, and the feed lot operator will be assured a dependable market at competitive prices. The meat packer may have to provide capital, and perhaps even a form of management. Broiler and egg complexes appear to be adaptable to the support of cattle and hog feeding operations, even to the point of piping in management. It is doubtful if the expansion of cattle and hog feeding operations would be any more limited by the supply of feed grain than are poultry enter-

prises. Whether expansion will be limited to the demand in the South for quality meats will depend largely on how high a level of productive efficiency can be achieved. Quite high levels of productive efficiency would enable the most westerly of the southern states to compete quite effectively for the large and rapidly growing markets in the West.

In conclusion, opportunity exists for increased cattle and hog production to supply some of the South's demand for additional income. Particularly in beef cattle production, successful innovators will be well rewarded during the next decade. Southern farmers need to overcome their propensity for following the technological lead of farmers in other regions. In a field of production experiencing rapid technological change, it is unlikely that a borrowing region can possibly keep abreast of a technology-creating region. For the South, becoming a creator of technology is largely a matter of aptitudes, attitudes, and confidence. On these psychological and sociological factors that stand in the way of Southern economic progress, the Past-President of this association, Professor William H. Nicholls, has written analytically and usefully.[2] In overcoming both the motivational and the technical barriers to the expansion of cattle and hog production in the South, there is a great deal for research and extension workers to do, especially in the development and assistance of farmer innovators.

[2] *Southern Tradition and Regional Progress* (Chapel Hill: Univ. of N.C. Press, 1960).

ADJUSTING LIVESTOCK FARMS IN THE NORTH CENTRAL STATES TO THE PROSPECTS OF THE 1960'S

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IT IS my view that the prospects for North Central livestock farms in the 1960's can be summarized in two words—severe competition. This includes competition with the farmers of other areas for markets, with other industries for resources, particularly labor and capital, and with other farmers for all production resources. While it is probable that the action of Government may tend to lessen the competition for markets, it is possible that the severity of competition for some production resources will be increased. For example, a supply management or control program that places primary emphasis on part-farm land retirement might reduce the competition for markets for farm output but materially increase the competition for land.

It is my view also that in the last decade it has been adequately demonstrated that the adjustment of aggregate supply to prospective demand, at prices generally believed to be fair and equitable, is largely beyond the capabilities of individual action. Hence, this type of adjustment must be facilitated largely by group action, with or without the assistance of Government. However, a large area of agricultural adjustment is left for individual action. This area includes (1) adjustment of the combination of enterprises to meet shifts in relative demand—for beef versus hogs, for example, (2) changes in factor combination and technology to produce specified levels of output, and (3) changes in farm size or levels of output. It should be recognized that the nature of the industry is such that farmers are forced to adopt average cost-reducing but output-increasing techniques in an effort to maintain and improve their own financial positions, even though the aggregate effect is to increase production and add to the surplus problem.

With an assignment such as adjusting livestock farms to the prospects of the 1960's, one is tempted to envision giant farms of several thousand acres with large feeding plants in which hogs and cattle are fed by the tens of thousands. But existing research information suggests that these temptations be curtailed. A study by Heady, McKee, and Haver, published by Iowa State University in 1955, concluded that "a farm of 240 acres, one falling within most of the definitions of family farms, is large enough to realize the major reductions in cost."[2] A later study by Beneke

[1] The author is indebted to C. W. Crickman and D. F. Fienup for helpful criticisms.

[2] Heady, E. O., McKee, D. E., and Haver, C. B. *Farm Size Adjustments in Iowa and Cost Econ. in Crop Production for Farms of Different Sizes.* Iowa Agr. Expt. Sta. Res. Bul. 428. May 1955.

and Alexander[3] concludes that farms in the 300 to 400 acre range are large enough to achieve most of the economies that can arise from size alone at the present time. Since the authors state that their study largely reconfirms the earlier Iowa studies, I assume that the difference beween the 240-acre figure and the 300 to 400 acre range is not a function of the data of the study but is related to the definition of "most." Beneke and Alexander used these measures of machinery efficiency: (1) The machine and power investment per $100 of crop output; (2) machine and power costs per $100 of crop output; and (3) labor and machinery costs. The figures for each acre size group are shown in table 1.[4]

TABLE 1. MACHINERY EFFICIENCY ON IOWA FARMS (CASH GRAIN AREA)

Farm size group	Machinery and power investment	Machinery and power cost	Labor and machinery costs
	Dollars	*Dollars*	*Dollars*
160 acres	42.28	20.60	27.65
320 acres	33.13	15.40	21.36
500 acres	35.00	16.95	22.50
1,000 acres	31.27	15.07	21.49

The authors found that with all three measures of efficiency, the 320-acre farm had a considerable advantage over the 160-acre farms—about a $9 advantage in machinery and power investment per $100 of crop, a $5 advantage in machinery and power costs, and about a $6 advantage in labor and machinery costs per $100 of crop product. The 1,000-acre farms had less of an advantage over the 320-acre farms with respect to machinery and power investments and costs, and a slight disadvantage ($0.13 per $100 of crop product) with respect to labor and machinery costs. The higher labor costs on the 1,000-acre farms arose from inability to use the labor available as efficiently as the 320-acre farms. Operator-time used for supervision ranged from 26 to 60 percent on the $1,000-acre farms. The time to prepare for and perform crop operations averaged 4 hours per rotated acre on the 1,000-acre farms compared with 3.7 man-hours on the 320-acre farms, despite the higher capacity machinery on the larger farms. In order to reduce labor requirements and improve distribution, operators of large farms had lower proportions of their lands in hay, plowed down more of their fertilizer instead of using starter or side dressing, power checked their corn, tended to cut their hay and typcially cultivate their corn twice instead of three times.

The 1,000-acre farms in the Beneke-Alexander study represented all the

[3] Beneke, R. R. and Alexander, J. M., "There's a Best Size for Iowa Farms." Co-op Grain Quarterly, Vol. 19, No. 1, 1961.

[4] Beneke and Alexander, *op. cit.*, p. 61.

farms of that size the authors could locate in the area. The smaller farms were *selections* of efficient farms in the same area. The authors noted that the best operators of 1,000-acre farms achieved lower costs than the best operators of the smaller farms. Nevertheless, they concluded that any rapid trend toward 1,000-acre farms could call for greater economies than appear to exist.

Yet, one should not underestimate the need for individual farmers to continue to expand the size of their farms if they are to meet the competition they face in the decade ahead. According to the 1959 census definition of farms, only in the tier of States from North Dakota to Kansas in the North Central Region were more than 26 percent of the farms in the 260 acres or above size group. This does not mean that the western tier of States is more nearly in adjustment in regard to farm size. It means only that the production of small grain in these States requires and facilitates larger farms in terms of land area. It is dangerous to generalize from studies in one State, but with the Iowa study suggesting that a 320-acre farm approaches an optimum size farm, and considering the advantages in regard to machinery and labor costs of the 320-acre farm relative to the 160-acre farm, it seems safe to conclude that one of the more profitable adjustments for most farmers will be an increase in the size of their farms.

An especially attractive alternative to purchasing more land, particularly as land prices and wages increase, is the application of higher rates of fertilizer. The use of fertilizer has increased at a phenomenal rate during the last two decades. Yet fertilizer-use is far below that recommended by the State Agricultural Experiment Stations. For example, a survey in southeastern Minnesota[5] showed that in the 1958 crop-year, the average farmer in the sample had applied 14 pounds of N, 24 pounds of P_2O_5 and 28 pounds of K_2O on a 5-year rotation consisting of 2 years of corn followed by oats and 2 years of hay. Fertilizer recommendations for average soils in the area consist of 110 pounds of N, 106 pounds of P_2O_5 and 224 pounds of K_2O. It was estimated that this fertilizer application combined with pre- and post-emergence sprays for corn would increase yields by approximately 30 percent and net returns by about $13.70 per crop acre per year. Even though still higher rates of fertilization will add to the aggregate surplus problem in feed grains, there is little doubt that these higher rates are one of the more profitable adjustment opportunities for farmers in the region.

Cattle Feeding

During the last decade, the number of cattle fed as measured by the

[5] Sundquist, W. B. and Caldwell, A. C. "Profits from Fertilizer Uses." Univ. of Minn. Agr. Ext. Serv. *Minn. Farm Business Notes*, March 1960.

number on feed on January 1 increased by more than 30 percent in the North Central Region. Yet the region's share of the total number of cattle on feed in the United States declined from more than three-fourths at the beginning of the decade to about 71 percent at the close. Because of the year-round nature of the western commercial feedlot, the share of the market held by the North Central Region undoubtedly declined to an even greater degree. Further, with the decline in importance of the central market, the selling advantage of the large commercial feedlots is enhanced. The conclusion is inescapable that the typical small cattle feeder in the North Central States is faced with severe competition from other regions. Although it may not become necessary to convert to the California type of commercial feedlot, a study of the comparative advantage of the large specialized feedlot and the farmer-cattle feeding operation is a worthy subject of research.

Cattle feeding on farms in the North Central Region provides a means of utilizing some feeds with a relatively limited market. If efforts to control production of feed grains are effective in reducing the supplies of these grains relative to forages and in increasing the relative price of grains, the relatively small Corn Belt feedlot operators who produce their own corn and have forages with an otherwise limited market will profit. The effort to decrease feed grain supplies, recent developments in tenderization of meats, and continued emphasis on less fat in the diet, point to the need for consideration of increased feeding of cattle relative to hogs and fattening cattle to a lower finish. However, if grades are not adjusted, prices to farmers are not likely to reflect a smaller demand for fat carcasses and profit considerations may still dictate feeding to a higher degree of finish.

Cattle feeding also makes excellent supplemental use of labor which, in most areas, has a limited market on a part-time basis. While the labor used in cattle feeding is not an important cost, there are important economies in use of labor as the size of the lot is increased. In a Minnesota study, Johnson and Nodland[6] found that tripling the number of feeders in the lot from 40 to 120 less than doubles the chore load. For calves fed for a period of 47 weeks—4 weeks of hay with limited grain, 22 weeks on a full feed of silage with limited grain and hay, and 21 weeks on full feed—a 40-head lot required about 10.6 hours per head. Increasing the size of the lot from 40 to 60 head reduced the labor per head by the same amount (1.8 hours) as increasing the lot size from 60 to 120. An additional 180 head (or a total of 300) would further reduce the labor per calf by only about 1 hour per head. With 120 calves in the lot, self-

[6] Johnson, R. J. and Nodland, T. R. *Labor Used in Cattle Feeding.* Minn. Agr. Expt. Sta. Bul. 451, p. 12. March 1960.

feeding of silage from a horizontal silo[7] would save labor amounting to about 0.5 hour per head. Large feeders may need to consider more mechanized feeding systems as a way of obtaining labor with which to expand the size of their feeder cattle enterprise.

Pork Production

Although the share of the beef market held by producers of the North Central Region has decreased during the last decade, the share of the pork market held by the region has held relatively constant at about 75 percent. The competition for markets has come not so much from other regions as from other meats. While the number of cattle on feed in the United States increased about 30 percent during the last decade, the number of sows farrowed never passed the peak of 19.7 million head farrowed in 1943. The peak in the 1950's was the 15.4 million head farrowed in 1951. Hog producers must recognize that since World War II, the demand for pork relative to other meats, particularly beef, has decreased. Thus with a constant or declining market, and with a low price elasticity, any large aggregate expansion is likely to bring serious results.

As with beef cattle, most studies indicate some economies as the size of the hog enterprise is expanded. In an Ohio study, Bailey and Sitterly[8] found that to maintain the breeding herd and to produce and market two litters of fat hogs required about 53 hours per sow with about 8 sows and only 28 hours per sow with 22 sows. An Indiana study[9] involving larger hog enterprises found that the labor used decreased from 29 hours per sow with a 20-sow herd to about 23 hours per sow with a 40-sow herd. Man-hours per sow held constant at that figure through herd sizes up to 60 sows on a two-litter system. Capital requirements including feed, building equipment, breeding herd, and annual use cost of machinery totaled to $515 per sow for a 10-sow herd but to only $378 per sow for a 60-sow herd. "Up to the 50-60 sow herd size small decreases tended to occur in all major cost categories—feed, man labor, building- and equipment-use, and miscellaneous costs. Differences in total costs between the 10 sow and the 60 sow herd size amounted to about $2.20 per cwt. or about $5 per hog marketed."[10]

Highly skilled operators may find that multiple farrowing-confinement

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[7] For information on labor used with horizontal silos see Van Arsdall, R. N. *Self-Feeding Silage to Beef Cattle from Horizontal Silos.* Ill. Agr. Expt. Sta. Bul. 642, p. 34. 1959.

[8] Bailey, R. A. and Sitterly, J. H. *Man Labor on the Commercial Hog Enterprise.* Ohio Agr. Expt. Sta. Res. Bul. 492. 1957.

[9] Bauman, R. H. and Eisgruber, L. "Moderately Large Hog Enterprises Again Pay Best." In *Econ. and Marketing Information for Indiana Farmers,* Purdue Univ. Ext. Serv. April 1960.

[10] Bauman and Eisgruber, *op. cit.*

feeding systems provide potentials for further cost reduction. But managerial requirements are great and many farmers may find themselves short on the skills required to operate such a system efficiently. Furthermore, unlike cattle feeding, the capital requirements for hog production are low, and by taking a lower price for their labor and considering their building and equipment costs as sunk costs, small producers may be able to maintain strong competition with larger producers for some time to come. This, combined with the strong competition from other meats, suggests that only the highly skilled operators should seriously consider the large capital investments associated with large multiple farrowing-confinement feeding systems.

While considerable effort has been devoted to the determination of the effect of size on input-output coefficients for individual enterprise, little attention has been given to a determination of the optimum size of enterprises within the framework of the entire farm.[11] If research is to be an effective guide to the long-range planning of individual farms in the region, more effort should be devoted to economies of size—the determination of minimum cost combinations of resources and technologies for each of many levels of output.

Because of the "lumpiness" of such resources as land and a large portion of the labor supply, opportunity costs rather than market prices of these resources are the proper allocators. Hence budgeting or activity analysis seems to be an appropriate method of study.

Many of the labor coefficients developed in recent years are linear when expressed in terms of the total labor used relative to the size of the enterprise. It is the high "fixed" labor requirement that brings about the declining average labor use per unit of output. It seems likely that many capital coefficients for such items as field machinery, mechanized feeding systems, and other chore equipment are of a smiliar nature. Recent developments in computer routines and in access to large memory units make the use of such relationships more feasible than in the past. For example, once a solution has been obtained for a specified level of gross income and a specified combination of machinery, equipment and other resources, a new beef or hog activity involving different variable coefficients can be introduced. The new fixed labor or capital coefficient can be introduced by changing the availability of the appropriate resources, and a new solution can be developed by computing from the previous solution. Continued substitution of activities representing different levels of technology and comparison of solutions would make possible the selection of the optimum technology for a specified level of output and

[11] A notable exception to this generalization is Ronald D. Krenz, *Farm Size and Costs in Relation to Farm Machinery Technology*. Unpublished Ph.D. thesis, Iowa State Univ., 1959.

plant resources, such as land and labor. Varying the level of gross income at discrete intervals and repeating the vector substitution process would make possible the determination of several points on a plant curve. Varying the level and combination of plant resources, such as land and labor, and repeating the above would make possible the determination of several plant curves from which a long-run planning or average-cost curve could be developed.

Another important area of needed research involves the integration into a national interregional competition model of such studies as the Lake States dairy adjustment study, the Northeast dairy adjustment study, and the proposed beef-hog study in the North Central Region and with studies in other regions. Such a study involving estimates of regional supply and demand functions combined with transportation costs would make possible the estimation of optimum production and distribution patterns. With this information available, research and extension personnel might avoid the embarrassment of recommending expansion of production of a particular commodity in an area that has a substantial comparative disadvantage.

DISCUSSION: ADJUSTING LIVESTOCK FARMS IN THE NORTH CENTRAL STATES TO THE PROSPECTS OF THE 1960'S

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Dr. Day has presented an interesting and thoughtful view of some of the problems involved in adjusting livestock to Midwest farms in the 1960's. All of his points are relevant, I believe, however, I would like to make some additions and perhaps modifications to Dr. Day's concepts of livestock adjustment.

A factor which may have a heavy impact on the feed grain base in the Midwest and, consequently, the livestock adjustment problem, is the possibility that wheat may be priced as a feed grain before the 1960's have run their course. Numerous experiments through the years have shown that wheat is a most satisfactory feed grain. On a per pound basis, wheat is equal to corn in dairy rations and about 5 percent more nutritious than corn for hogs, beef cattle, and poultry. Whereas comparatively little wheat has been fed since World War II, considerable wheat was utilized as a livestock feed before and during the war period. In fact, in the 10-year period from 1935 to 1944 almost three-and-one-half times as much wheat was fed than was exported (1,894 million bushels fed; 543 million bushels exported).

The economic adjustment problem created by utilizing wheat as a feed grain is not confined to the Plains and Western States when one considers that Michigan, Illinois, Indiana, and Ohio are among the 11 highest ranking wheat producing States (avg. 1950-59). In fact, their total average production (1950-1959) was 88 percent of the average production of the leading wheat-producer, Kansas. Lack of alternative crops in some areas of the Plains and Western States and the relatively high profitability of wheat in some Corn Belt States indicates that considerable wheat will continue to be grown.[1]

Some assume that with wheat and grain sorghums as a feed base some of the Plains States will become large livestock feeding areas. Whereas time may prove this assumption correct, there will be definite obstacles to confront—lack of experience in handling livestock, credit availability, and the fact that many farmers may attempt a specified rather than maximum income. But the issue of *where* wheat might be fed is less important than the fact that if it is priced at competitive feed grain prices, it *will* be fed.

Dr. Day has pointed out at least two ways in which the size of the farm business (and perhaps the size of the livestock production plant) may increase in the 1960's—addition of land and increased use of fertilizer. Irrigation is one area for expansion of farm business size (and perhaps livestock output potential) that is very real to us living on the periphery of the Corn Belt. In the last 5 years, the United States as a whole has not increased net irrigated acres dramatically but the drought in the mid-50's brought about a rapid increase in irrigation in some of the Corn Belt rim States. For example:

	Irrigated acres		*5 yr. net increase (acres)*	*1959 acres as a percent of 1954*
	1954	*1959*		
United States	29,552,155	33,017,822	3,465,667	112
Nebraska	1,117,369	2,077,926	906,557	177
Kansas	331,551	762,231	430,680	230

In Nebraska, over 80 percent of the irrigated land is in feed grains and another 10 percent produces alfalfa hay—all livestock feed. One source believes that, as a conservative estimate, the number of irrigable acres in

[1] It should be pointed out, however, that if wheat is priced as feed grain, the location of production is largely an unanswered question. For insights into this problem the following references may be useful:

Egbert, Alvin E., and Heady, Earl O., *Regional Adjustments in Grain Production, A Linear Programing Analysis*, Tech. Bul. 1241, USDA in cooperation with Iowa Agr. Exp. Sta., June 1961.

Welsch, Delane E., "Profitable Adjustments for South Central Nebraska Farms under Various Proposed Wheat Programs," M.S. Thesis (to be submitted to Graduate College, August 31, 1961) Univ. of Nebr.

Bailey, Warren R. and Aines, Ronald O., *How Wheat Farmers Would Adjust to Different Programs*, Prod. Res. Rpt. 52, ERS, USDA, May 1961.

Nebraska could be doubled.[2] In other Corn Belt States, some potential undoubtedly exists for expansion of irrigation.

Dr. Day indicates that we should anticipate severe competition from other regions for resources. Generally, I am in agreement with this statement but a possible complementary area with regard to the cattle-feeding industry should be pointed out. Specialization of phases of cattle feeding could have a complementary rather than a competing effect. It has been indicated that cattle feeding is a method of utilizing certain feeds with a low opportunity cost—stalks, some hays and roughages, wet corn, etc. I am not convinced that higher proportions of roughages will be used in livestock rations; herein may be an opportunity for creating a complementary relationship between the farmer feeder and the large commercial feeder. The farmer feeder could buy calves and with a relatively high roughage ration attempt a gain of 300-400 pounds per head. These same cattle would be taken by the commercial feeder to finish out on a relatively low-roughage ration to the weight and market grade deemed best.

Still another complementary area in beef cattle feeding might develop from the expansion of profit-sharing contracts between range operators and feedlot operators. Hassler has stated that "the speculative game of shifting windfall profits and losses between these two levels should be reduced so that a better value indicator would be available to range operators for long-run herd management."[3]

Another factor which should have a direct effect upon the amounts and possibly kinds of livestock on Midwest farms in the 1960's is the method of obtaining credit. Too often those involved in farm planning take little cognizance of financing methods in general and capital rationing in particular. And only a cursory review of literature of farm planning involving linear programing or budgeting will reveal that the optimal plan often calls for large numbers of feeder cattle. The reason for these solutions is that we tend to look at the *average long-run* income from certain livestock enterprises and utilize this information in the price coefficients. Whereas a plan calling for large numbers of feeder cattle may be the long-run micro optimum, we also know that cattle feeding is characterized by larger variations in interyearly income than, say, dairy or hogs.[4] The weaknesses in our planning are usually caused by not incorporating a "risk" factor into the budget or program, a failure to recognize capital limitations, and the fact that the escape hatch of "long-run planning" is available.

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[2] Conversation with Arlen Lutz, Assistant State Leader, Programs and Reports, Agr. Ext. Serv., Univ. of Nebr.

[3] Hassler, J. B., "The U.S. Livestock-Feed Economy (Implications for the Great Plains)," paper presented to the Great Plains Council, Bozeman, Mont., July 26, 1961.

[4] Swanson, Earl R., "Livestock Income Variability," *Ill. Farm Econ.*, May 1954.

Finally, I do not think we can forecast changes in the Midwest livestock industry without predicting other possible changes particularly in institutions. Rather than predicting these changes I will take the less hazardous path of posing a few questions:

1. Are any discernible changes in tenure patterns emerging? For example, if we expect more livestock share leases, then the livestock pattern may be altered.

2. Are any changes in the policies of lending agencies foreseen? If, for example, we could foresee a trend toward longer term loans and away from equity financing then some changes may be forthcoming in the amounts and kinds of livestock on farms.

3. What change may occur in agricultural economic policies and programs?

a. Will there be a long-run land retirement program?

b. What will be the Government policy toward disposal of existing stock of wheat and feed grains?

In summary, I would like to append the following considerations to Dr. Day's concepts of fitting livestock to Midwest farms in the 1960's:

1. Increased use of irrigation could mute some of the effects of land retirement and feed grain reduction programs.

2. Use of wheat as a feed grain could cause a change in the livestock feed base and location of feeding enterprises.

3. Changes in the organizational structure of the cattle-feeding industry might lead to specialization and change the feeding program of Midwest farms.

4. Various changes in governmental policy, credit, and tenure are variables which could be overriding features in livestock adjustment in the 60's.

ADJUSTING LIVESTOCK FARMS AND RANCHES IN THE 11 WESTERN STATES TO THE PROSPECTS OF THE 1960'S

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BEFORE one looks at the problem of adjusting livestock farms and ranches in the 11 Western States to the prospects of the 1960's, it would be profitable to look at the present situation within the livestock industry of the West and its relationship to the rest of the Nation. In the 1950's, the West produced, on an average, 12.6 percent of the country's red meat. Nationally, this represented 2.2 percent of the pork, 45.5 percent of the lamb and mutton, and 18.5 percent of the beef produced. The 1959 value of the red meat produced in the West was $1.52 billion. Cattle accounted for 87.4 percent of this 1959 value; sheep, for 7.7 percent; and hogs, for 4.9 percent. It is obvious from the figures cited that cattle are the important factor in the livestock industry of the West.

Production of pork in the West is, and will continue to be, unimportant nationally. Iowa's hog production in 1959 was almost 10 times as great as that for the 11 Western States combined; in addition to Iowa, 9 other States exceeded the West's production.[1] Because hogs are of minor importance, adjustments in their production are not discussed in this paper.

While the sheep industry of the West is relatively large and important, space and time limitations imposed on this paper are such that this area cannot be covered. The industry has many special and specific adjustment problems that merit more extensive treatment than can be given here.

The Western cattle industry differs from that in the rest of the United States. Traditionally, the West has a higher proportion of beef cattle—82 compared with 65 percent for the rest of the Nation; the beef herd in the West has a higher proportion of cows and heifers 2 years old and over, which means that this is primarily a calf-producing area.

During the 1950's, the relative position of the West as a producer of the Nation's red meat supply has shifted significantly. This was due primarily to the expansion of cattle feeding. Estimated numbers of cattle on feed January 1, 1950, in the 11 Western States was 695,000.[2] In 1960, the estimated number was 1,925,000.[3] The comparable figures for the rest of the United States were 3,753,000 in 1950 and 5,610,000 head in 1960. The percentage increase in the West was approximately 3½ times as large as that in the rest of the United States. If data on the total number

[1] *Agricultural Statistics*, USDA, 1951-1960. Washington, D.C.
[2] *Agricultural Statistics*, USDA, 1951. Washington, D.C.
[3] *Livestock and Meat Statistics*, Supplement for 1960, AMS, USDA, Washington, D.C., June 1961.

of cattle fed were available, the West would show an even greater relative increase because of the large number of western feedlots that operate on a year-round basis.

In looking at the adjustments that are likely to be made in the 1960's on western cattle ranches and on farms that feed cattle, certain assumptions are needed: (1) Livestock prices will fluctuate less but average about the same as they did in the 1950's; (2) the importance of the terminal market as a price-determining factor for livestock will decline; and (3) the cash costs in agriculture will continue to increase and the price-cost squeeze will continue throughout the 1960's for livestock operators, as well as for other farm operators.

Factors Influencing Structural Changes

Substantial changes are occurring in the structure of the western cattle market. Most people who work in the industry believe Federal grading of beef and the relatively dominant position of supermarket chains in meat retailing are major factors in shaping these changes. Buying on specification by chain stores influences the packing industry directly and the rest of the cattle industry indirectly. Packers have developed contacts with feeders and ranchers as a means of obtaining the desired volume and quality demanded by the chains. This development, together with other factors, has resulted in expansion of country selling. In 1957, approximately 8.5 million head of cattle and calves were slaughtered in the 11 Western States. Of these, only 2 million, or less than a fourth, were sold on central markets for immediate slaughter.[4] Further evidence of increased direct sales is the closing of the terminal markets at San Francisco and Los Angeles. The Denver Union Stockyard Company estimates that cattle and calves handled in 1961 will approximate 48 percent of the anticipated Denver slaughter; this compares with 96.8 percent in 1953.[5] Portland is the only terminal market in the West in which the volume of cattle handled has increased in the last few years.

Large-scale feeding operations in Arizona, California, and Colorado lend additional impetus to direct marketing operations. As of January 1, 1960, about 880 feedlots in these 3 States had approximately 60 percent of the estimated number of cattle and calves on feed in the West. Most feedlots within these States are concentrated in a few relatively small areas, and thus prospective purchasers have a chance to see more fat cattle in a day than they could see on a terminal market in a week. Also, these buyers of fat cattle have the advantage of seeing next week's or next month's supplies in process.

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[4] Able, Harold. Statement to Colo. State Agr. Planning Committee, Feb. 18, 1960.
[5] House Rep. No. 2234, 86th Congress, Second Session.

The concentration of feeding may have created an oligopolistic situation in the feeder cattle market. Generally speaking, this is an advantage to all cattle feeders, but it is disadvantageous to cattle ranchers who have fewer opportunities to sell their feeders.

The recent "fat-man scare" on cholesterol and recent progress in meat tenderizing could change consumers' "meat-type ideal." These developments could change the nature of the demand for lean or for fat-type beef and could thus have a considerable impact on the western cattle industry. In the 1960's, large-scale feedlots and improved feeding technology, as well as improved breeding of cattle, will produce a more standardized beef product. The industry's major end-product will be a younger, more tender animal with less fat. This will mean that the industry will continue its recent "push" to develop faster gaining animals. More cattle will be finished in feedlots and will be fed for a shorter period of time—probably averaging 120 days. With these conditions in mind, I shall discuss briefly how two types of cattle operators—cattle ranchers and farmer-feeders of cattle—will adjust to these changes.

Cattle Ranchers

During the 1950's, the net returns of cattle-ranch operators in the West were low. Returns to labor and management averaged less than for agriculture as a whole. Operating costs of cattle ranches have increased, as have costs of other agricultural enterprises. Most of these increases, however, are not associated with production-increasing practices. Higher taxes, wage rates, and investments in land, account for most of these costs.

With the likelihood of the cost-price squeeze continuing during the 1960's, what adjustments can be made to provide satisfactory incomes? Ranchers can increase the size of the their plants and/or reduce their input-output ratios through improved management.

Improved management

Potential production from some ranch resources can be increased at reasonable costs. For example, meadow improvement in the mountainous areas of the West could increase forage production from the meadows by an estimated 75 to 400 percent. Land leveling, improved irrigation methods, and fertilizer programs can bring about these increases. During the 1950's, a few ranches started meadow-improvement programs; these, however, account for a relatively small part of the land suitable for improvement. Ranchers have done more to improve ranges than meadows, but again they are not realizing maximum economic returns. Such practices as sagebrush spraying, range reseeding, better grazing control of cattle, and so on, are used extensively and with good results.

Research findings on effective brush control are encouraging. Before 1970, considerable progress will be made in effectively controlling most types of brush.

Most operators can increase their production efficiency by using such practices as pregnancy testing of their brood cows and fertility testing of their bulls, along with better health and breeding programs. It is conceivable that the percentage of calves weaned could be increased by 10 percent, or more, if these practices were fully utilized. In addition, a better health and breeding program should increase the amount of beef produced per cow. The combination of these practices has the potential to increase beef produced per cow by 20 percent. However, a 10 percent increase is more in keeping with what we might expect for the industry by 1970.

Increasing size of ranch

There are limitations on expanding the base of the western cattle industry. Most of the usable rangeland is currently grazed by either cattle or sheep. It is expected that cattle will replace sheep on some of the rangelands, particularly with the widespread adoption of range-improvement practices, and if the returns to sheep ranches continue to remain relatively unfavorable. At present, however, the acreage of rangeland on which cattle can be substituted for sheep is rather limited. Also, the number of animal unit months (AUM's) of feed, whether for sheep or cattle, provided by Federal lands will probably continue to decline. This rate of decline may be reduced because of improved forage production available from the various range-improvement programs instituted by the Forest Service, the Bureau of Land Management, and the permittees using the lands administered by these agencies. Essentially, by 1970, the rangelands will supply fewer AUM's of feed for livestock than they supplied in 1960, barring a large Federal program of reseeding cropland to grass in the Great Plains.

In addition, the possibility of genuine cattle ranchers acquiring more land has been decreasing in most areas of the West. Wealthy individuals and firms frequently purchase ranch properties for income-tax purposes or nonagricultural uses. In some areas of the West, more ranches are owned by these people than by resident ranchers. In the foreseeable future, it is likely that ownership of a significant portion of the privately owned ranch properties will be transferred to owners who will not themselves operate the properties.

What adjustments should cattle ranchers in the West make in order to cope with the prospects of the 1960's? The rancher without an outside income may need to have a breeding herd of 200 head of cows or a comparable unit. The sum of his indebtedness on real estate, machinery, and

cattle should be held to less than 50 percent of its value. His production rate will need to be high. His weaning rate may need to exceed 90 percent. Pregnancy and fertility testing and improved health and breeding programs will be necessary if he is to achieve these goals. In addition, range improvement and good farming practices will be required to complement this operation. Western cattle ranchers will take on even more of the characteristics of good farmers and alert businessmen and less of those of cowboys on horseback. Factors that will limit achievement of these desirable changes will include risk and uncertainty, managerial ability, and capital availability. Risk and uncertainty can be reduced by more intensive use of available information. At the same time, the problems associated with management and capital will increase greatly.

Farmer-Cattle Feeders

During the 1960's, the problems and adjustments of the commercial feeders and the farmer-feeders will differ. No attempt is made here to present the problems of adjustment for commercial feeders except as they influence the farmer-feeder's problems.

The West's cattle-feeding industry is becoming more specialized, and cattle feeders find that they need to continue to improve and expand their feeding operations. The proportion of cattle fed by commercial feeders and large farmer-feeders is increasing. This means that concentration of cattle feeding increased in the 1950's, and that apparently it will continue in the 1960's. A study of the irrigated farms and cattle-feeding enterprises in northeastern Colorado indicates the rate of concentration during the period 1953-59 (table 1).

The most significant item in the table is that the nonfarmer feeders (large-scale feedlots) in the South Platte Valley increased the percentage of cattle they feed to 35.7 percent from 18.5 percent during this period.

TABLE 1. CATTLE FED, IRRIGATED PORTION SOUTH PLATTE VALLEY OF COLORADO, BY TYPE OF OPERATOR, 1953 AND 1959

	1953			1959		
	No. of operators	Percentage of operators	Percentage of cattle fed[1]	No. of operators	Percentage of operators	Percentage of cattle fed[1]
All operators	4,801	—	—	4,157	—	—
Farms, irrigated						
Feeding no cattle	2,072	43.2	—	1,883	45.3	—
Feeding less than 500 hd.	2,599	54.1	59.6	2,145	51.6	37.4
Feeding more than 500 hd.	61	1.3	21.9	53	1.3	26.9
Nonfarmers feeding	30	.6	18.5	59	1.4	35.7
Others	39	.8	—	17	.4	—

[1] Cattle fed in 1953 numbered 474,800, and in 1959, 718,200.

But if we consider ownership of the cattle fed within the area, this is an understatement. Many of the cattle fed by farmer-feeders are owned by the nonfarmer group. Information obtained from county assessors' records in the area indicates that the nonfarmer group owned more than 45 percent of the cattle fed, rather than the 36 percent as indicated in the table. The 18 percent indicated for 1953 more nearly represents the ownership situation that existed during the early 1950's.

It is anticipated that concentration of feeding will continue in the major feeding areas of the West—Arizona, California, and Colorado. Farmer-feeders, therefore, must adjust their operations to take advantage of this concentration or to minimize its effect.

Most farmer-feeders produce all the roughages and some of the grains that are used in the feeding enterprise. In so doing, they are marketing a considerable portion of the farm production and unsalable byproducts through cattle. In addition to the feed, cash operating costs are relatively low because the amounts of labor and equipment required for the feeding enterprize are small. Because of the higher roughage ration normally used, the average rate of gain for the cattle fed is generally lower than in the commercial lots.

The principal disadvantages faced by farmer-feeders result primarily from lack of volume. Direct buyers are less likely to contact them, which reduces sale alternatives. Also, buyers of small lots of cattle, whether on a direct basis or at the terminal market, tend to discount price because of such unknowns as the amount of fill, the method of feeding, and the general handling conditions.

What adjustments can farmer-feeders make to improve their competitive position? On the production side, more cattle could be fed than at present if the finishing ration approached that used by commercial feeders. This would mean buying additional supplement and grain to balance the roughages that are available. The rate of turnover and the volume of beef produced would be increased with relatively little or no additional risk.

Another possibility would be to feed a high-energy roughage ration, such as butt silage, as reported by Hugh E. Henderson of Michigan State University.[6] He said that feeding butt silage is potentially more profitable than feeding grain-roughage combinations on Corn Belt farms. In the West, the potential advantage is even greater, because many areas cannot produce mature corn because of short growing seasons. There are undoubtedly other systems or techniques, such as improved pelleting, that are or will be available to farmer-feeders that may increase production

[6] Henderson, Hugh E., "Butt Silage, the Complete Cattle Feed," *The Farm Quarterly*, Spring 1961.

and also reduce the cash costs per pound of beef produced. Farmer-feeders as a group must improve the input-output ratio if they are to compete effectively with the commercial cattle feeders.

Farmer-feeders can improve their market position and reduce risks in several ways. All of these alternatives are presently used, although on a limited scale. Horizontal integration through a cooperative or joint-venture feeding enterprise is one possibility. This permits the farmers involved to pool their feeding-equipment purchases, integrate their feed production, and present to the market a larger volume of uniform cattle. Operations of this kind have been started in western Kansas and eastern Colorado in the last 2 years. It is too early to assess their success, but I believe that it is a move in the right direction.

The second alternative is to integrate vertically. In most instances of this type, the farmer-feeder does not finish the cattle—he puts on the early gains. Finishing is done in the commercial feedlot. In many instances, this type of arrangement has been advantageous to both parties. It shifts most of the risk and management to the large operator and provides the farmer with a method of marketing his roughage and labor.

With the third alternative, which is a variation of the second, the farmer accepts the entire risk by buying the cattle, feeding them for a period of time, and then having them finished in a commercial feedlot. In so doing, the farmer-feeder is able to take advantage of the marketing power of the commercial feeder.

Conclusions

In the 1960's, cattle will continue to provide the major source of agricultural income in the West. The impact of specification buying by the chain stores will increase pressure on the cattle ranchers and feeders to standardize the type of cattle produced and marketed.

Cattle ranches will become larger and by necessity more intensely managed. If these units are to remain competitive, input-output ratios will need to be improved.

In the 1960's, relatively more cattle will be fed in the Western States and more will be fed in large-scale feedlots. If they are to stay competitive, farmer-feeders will need to increase the scale and efficiency of their operations either as individual entrepreneurs or through vertical or horizontal integration.

DISCUSSION: ADJUSTING LIVESTOCK FARMS AND RANCHES IN THE 11 WESTERN STATES TO THE PROSPECTS OF THE 1960'S

ANDREW VANVIG
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Dr. Hunter has given us in a rather straightforward manner the adjustments he sees facing western cattle ranchers and farmer-feeders in the decade of the 60's.

I believe there is general agreement that important structural changes are occurring in the western cattle market. Dr. Hunter mentioned the decline in importance of terminal markets and the increase in country selling. His reference was largely to fat cattle marketing. The same shift toward country selling is taking place with feeder cattle. In a 1959 study over two-thirds of the Wyoming cattle ranchers were selling direct compared to about one-half 10 years earlier. For the largest ranches in our study, those with over 800 head, direct sales made up about 90 percent. Of the smaller ranches about one-half were using the terminals and auctions.

Dr. Hunter attributes the decline of terminals and expansion of country selling almost entirely to specification buying by chain stores and the concentration of large scale feedlots. I would suggest there are other important factors as well, such as (1) the movement of packers out of terminals and the resultant loss in locational advantage of the terminal market, (2) the improvement of truck transportation on highways, (3) the seller's desire for selling at his own ranch or feedlot—he knows what he will get before the cattle leave his place, and (4) highly regulated trading on terminals versus virtually unregulated trading in the country which means chances for bigger margins for trading in the country.

Dr. Hunter mentions two ways that cattle ranchers can adjust to changes to be expected in the 60's. These are first, the reduction of input-output ratios through improved management and second, increasing the size of the ranch. In other words, reduce unit costs and increase volume. I agree, however, from the rancher's standpoint this is probably easier said than done.

Studies at Wyoming show that increases of 200 and 300 percent in grass production are obtained with aerial spraying of sagebrush. Current costs for aerial spraying average about $3 per acre and often ACP cost sharing is possible which brings the rancher's cost down to about $1.50 per acre. Returns are highest in the higher rainfall areas but appear favorable even in areas with 8-13" rainfall. An estimated 300,000 acres in Wyoming have already been sprayed for sagebrush and substantial

additional acres in Wyoming and elsewhere in the West appear to be economically feasible for spray control.

Another area for range improvement would be stock water development to allow better livestock distribution and utilization of range. This is tied in very closely with public land policy since these are often the lands needing it most. Stock water development also in some areas can mean a shift in use from a winter sheep range to a summer cattle range.

A difficulty with many range improvement practices from the standpoint of adoption by ranchers lies in the fact that the ranchers, like a lot of other people, have a short-term time preference for returns. And for some of these practices, while the costs or investments are incurred at once or in 1 year, the rancher has to wait several years for the returns. Adoption of some range improvement practices also is hindered by the need to forego use of the range entirely for 1 or 2 years.

I believe that ranchers, generally speaking, have done more toward improved livestock management than they have toward improvement of ranges and mountain meadows. However, opportunities do exist for increasing calf crop, and increasing the weight of calves at market time. More careful culling of cows is needed. Ranchers would do well to follow the performance records of their cattle in the feedlots and the cut-out values of their animals at the packer and retailer.

I feel considerably more attention needs to be given to marketing at the ranch level. Some studies being conducted by Kearl,[1] at our Station, for the Northern Plains Area indicate that earlier marketing of feeder cattle may be profitable for many ranchers. He has compared growth curves of yearling feeder cattle during the summer and fall and related these to various price trend situations (e.g. an upward trend situation, a topping out situation, a level or even price situation, and downward trend price situation). Daily gains of feeder cattle on the range are highest early in the grazing season and generally decline toward fall. By comparing the gains month by month, and the expected prices which the rancher will receive, some guides can be given for optimum marketing time. Earlier marketing of feeder cattle may also allow a rancher to carry more cows. With the trend toward year round feeding, especially in the west, and the emphasis on younger, lighter cattle, ranchers may also need to give consideration to marketing feeder cattle more than once a year.

The problem of increasing size of ranch is vividly brought out when one looks at the tremendous capital investment required in ranching. Recent studies at Wyoming[2] indicate that at current cattle prices and land

[1] Kearl, W. G., "Beef Cattle Prices and Rancher's Decision-Making." Manuscript in progress, Wyo. Agr. Expt. Sta.

[2] Stevens, D. M., and Agee, D. E., "Mountain Valley Cattle Ranching in Wyoming," Wyo. Agr. Expt. Sta. Mimeo Circ. No. 154, June 1961.

values, investments amount to about $850 per cow. On a 200-cow ranch, this would be a total investment of some $170,000 or about $85,000 per man (2 man ranch). Investment out-put ratios in ranching are among the highest in any type of agriculture. At current price levels, it takes an investment of about $700 to produce $100 annual gross income. Recognizing that some increase in size, at least toward the minimum economic sized unit, is required, a major problem facing the small ranches is how to get sufficient capital to increase size. More credit will be needed and used per ranch and some consolidation of smaller ranches with larger ranches will take place. Incorporation of ranches with shares of ownership held by family members or others may come into wider use.

Dr. Hunter points out that the major disadvantage faced by farmer feeders results principally from their lack of volume and he stresses the need for them to produce uniform cattle and to improve their input-output ratios. This is all well and good but then he seems to imply that the big feeders are producing uniform fat cattle. I question this, since if you look at the classes of cattle being fed by the largest feeders, it includes many sizes, many classes, and many types. There may be uniformity within lots, i.e., the large feeders are able to sort cattle into uniform lots and finish them uniformly but there is considerable variation from one lot to the next. In fact, one large feeder has said that he will feed any kind of cattle that he feels will make him some money.

Dr. Hunter paints for us, I think, a rather gloomy picture for the future of the farmer-feeders. One of his suggestions for changes they can make is through vertical integration with the commercial feeder. Personally, I have serious reservations as to the benefits that a farmer-feeder would achieve from such an alignment. At the present time the largest feeders are in a dominant position with respect to the local feed market, at least in a feed surplus area, and are often able to set feed prices. In this situation, it is unlikely they will hire the farmer to custom feed for them unless they can obtain favorable arrangements.

If integration is necessary for the farmer-feeder, I would hold out more hope for a horizontal type of integration—several farmer-feeders getting together in some manner. The concern of many with vertical integration is that the integrator comes out better than the one being integrated. And I expect that in an arrangement between a farmer-feeder and a commercial feeder—the commercial feeder would be doing the integrating.

Now for a few brief comments regarding the western sheep industry. In general, the present and near future profit prospects are not as bright for the sheep industry as they are for cattle. For many years feeder lamb prices have followed closely the trends of feeder cattle prices, but in the last 3 or 4 years feeder lamb prices have been low relative to feeder cattle prices. The Wool Act through the incentive program has stabilized the

returns from wool. But, in spite of this, the sharp decline in feeder lamb prices (at a level of 13-15¢ in Wyoming this year) has put a severe squeeze on net incomes of sheep ranchers.

What can the sheep ranchers do? I suppose in general the suggestions for improvement of ranges applies as well here as to the cattle ranchers. Fencing of ranges and the elimination of herders seems quite promising as another possibility. Fencing has resulted in a substantial reduction of labor costs, although this is partially offset by capital and annual maintenance costs associated with fencing. Some excellent results have been achieved with loose lambing (without lambing crews) which is also being practiced when ranges are fenced into pastures.

Sheep ranchers also will have to strive for increased lamb crops, and perhaps in the next decade it will be practical to get two lamb crops per year. To meet market demands, ranchers may need to sell lighter feeder lambs, or in some cases finish the lambs in the range area and sell them as fats.

If lamb prices continue low relative to cattle prices, we will likely see further shifts taking place from sheep to cattle where it is possible to do so. Or, in some cases as in Eastern Wyoming, we have seen sheep ranchers, after fencing, add cattle and then run both sheep and cattle.

ECONOMICS OF SOUTHERN PINE FORESTRY*

CHAIRMAN: AYERS BRINSER, UNIVERSITY OF COLORADO

FACTORS INFLUENCING THE CONSUMPTION OF SOUTHERN PINE

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This paper will discuss the principal factors which influence trends in consumption of lumber and pulpwood from the southern pines. Lumber and pulpwood account for about 90 percent of the annual cut of these species.

Factors which bear on the consumption of lumber in general will be considered first, followed by a discussion of those factors which apply particularly to pine. This will include an analysis of the competitive position of southern pine lumber. The same pattern will be followed for pulpwood.

THE native range of southern pine is a belt several hundred miles wide and more than a thousand miles long extending from Virginia south and west to Texas. Within this area, forest stands containing a fourth or more of their cubic volume in pine aggregate about 110 million acres. Stands of at least 50 percent pine amount to about 85 million acres. The acreage devoted to pine will probably increase slightly in the future as hardwood forests are converted to pine and as submarginal farm land is planted to pine under the Soil Bank and other public and private programs. Of the nine species of southern pine, four—shortleaf, loblolly, longleaf, and slash—account for 95 percent of the total volume. Shortleaf and loblolly together account for 73 percent of the total.

Southern pine is one of the Nation's most important softwoods. In the South it accounts for virtually the entire cut of softwood. The cubic volume is estimated at 49 million cubic feet, about 9 percent of the Nation's total growing stock and 14 percent of softwood growing stock.[1] But southern pine accounts for nearly a fourth of the total cut and growth of wood in the Nation. Southern pine moreover is growing faster than it is being cut, and thus the supply of this wood is tending to increase. The excess of growth over cut in cubic-foot volume is about 15 percent, and in live sawtimber volume 22 percent.

Southern pine's share of the lumber market has steadily declined dur-

* At this session, James E. Moak, Mississippi State University, presented a paper "The Changing Structure of the Southern Pine Lumber Industry." Arnold W. Bolle, Montana State University, was the discussant.

[1] USDA, *Timber Resources for America's Future*, Forest Serv. Rep. No. 14, 1958.

ing the last several decades. During the period 1910-1920, 37 percent of the Nation's lumber was obtained from southern pine, and in the 1950's its share declined to about 20 percent. It is now about 19 percent. Lumber exports declined from close to 1 billion board feet annually in the late 1920's to about 78 million board feet in 1959.[2] In the United States, consumption of southern pine lumber has declined markedly in areas outside the South. In 1919, for example, 218 million board feet were consumed for industrial purposes in New York. But in 1954 only 48 million board feet were used.[3] Retail lumber yards in central New York no longer stock southern pine dimension. Simultaneously with the decline in importance of lumber, however, southern pine's share of pulpwood output has increased from 5 percent in 1920 to about 55 percent today.

In addition to the decrease in the consumption of pine lumber, there has been a noticeable shift in the composition of demand for this lumber. Exteriors of southern homes have been one of the principal markets for the select grades of pine lumber, but this market has been almost completely lost to substitute materials. Thus the demand for the select relative to the common grades of southern pine lumber has decreased.[4]

Factors Influencing Lumber Consumption

Consumption of southern pine lumber is influenced, in part, by factors that affect the consumption of lumber cut from all species.

The increasing concern for lumber markets has created considerable speculation about the causes of declining lumber consumption. For many years price has been singled out as the most important cause. A glance at figure 1, which compares lumber and all commodity prices from 1850 to 1958, and figure 2, which compares lumber prices to prices of metal and metal products, farm products, and all building materials from 1890 to 1958, partly explains this emphasis upon price. From 1850 to 1900 lumber prices exhibited a slight divergence from all commodity prices; from 1900 to 1940 the gap between the two price trends widened; and since 1940 this divergence has become even more pronounced. The uniformity of the deflated lumber price trend in figure 3 suggests that there exists a fundamental relationship explaining the trend. For any commodity produced under conditions which satisfy the competitive model, the deflated price trend (R) is related to the productivity trend rate in the economy (Q) and in the industry (q) by the following formula:

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[2] *Lumber Industry Facts*, National Lumber Manufacturers Assn., 1960-1961.

[3] Deckert, R. and Hoyle, R., *Wood-Using Industries of New York*, State Univ. College of Forestry, Syracuse Univ., 1956.

[4] Row, C. and Guttenberg, S., "Changing Patterns Affect Pine Lumber Industry," accepted for publication in *J. Forestry*. Also: Zaremba, J., "Softwood Lumber Markets and Southern Forestry," *J. Forestry*, May 1961.

$1 + R = \frac{1 + Q}{1 + q}$.[5] Since the lumber industry is highly competitive, the trend of lumber prices depends upon these two productivity trend rates, further qualified, of course, for the influence of stumpage prices.

The rapid advances in productivity in agriculture are well known. For example, during the period 1947 to 1958 real product per man-hour in agriculture increased about 110 percent.[6] However, we are reasonably sure that productivity in the lumber industry was constant from 1899 to 1939, and there is little evidence that productivity has increased since 1939. Technological progress in logging, transportation, milling, and remanufacturing appears to have been largely cancelled out by such trends as declining size and quality of raw material and increasing distance between forest and sawmill. The foregoing formula indicates that with a zero trend rate of productivity in the lumber industry, the deflated lumber price trend will equal the trend rate of productivity in the economy. The deflated price trend in figure 3 roughly follows a 2 percent trend line, equivalent to the productivity trend rate in the whole economy during this period, just as the formula indicates.

The key to price competition in the long run is productivity; arresting

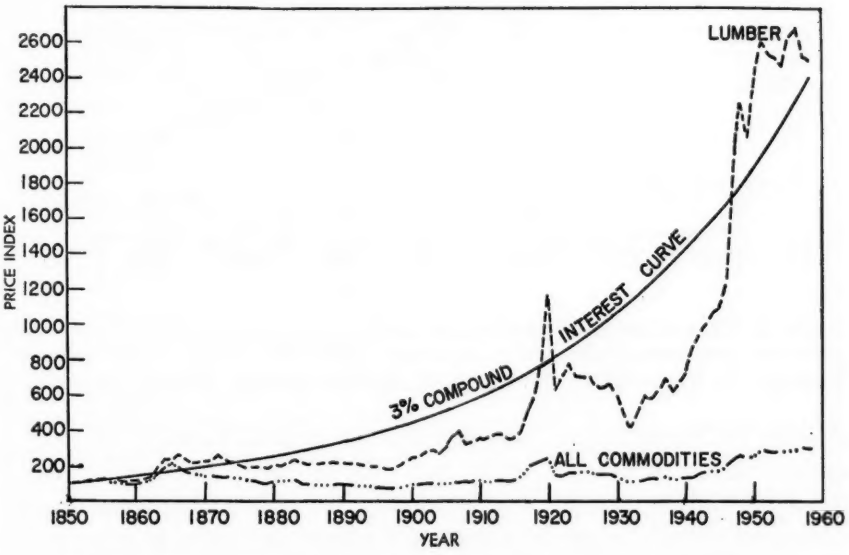

FIGURE 1. WHOLESALE PRICE INDICES FOR LUMBER AND ALL COMMODITIES, 1850-1958. (1850 = 100)

[5] Zaremba, J., "The Trend of Lumber Prices," *J. Forestry*, March 1958.

[6] *Trends in Output per Man-Hour in the Private Sector*, U.S. Dept. of Labor, 1909-1958, Bul. No. 1249, 1959.

the upward trend of lumber prices to be found in means for raising productivity. Prospects are not promising for a marked increase in productivity in the lumber industry. Increasing distance between consumer and the woods, particularly in the West, a continued decline in timber quality and stocking and perhaps even in sawmill size will very likely continue

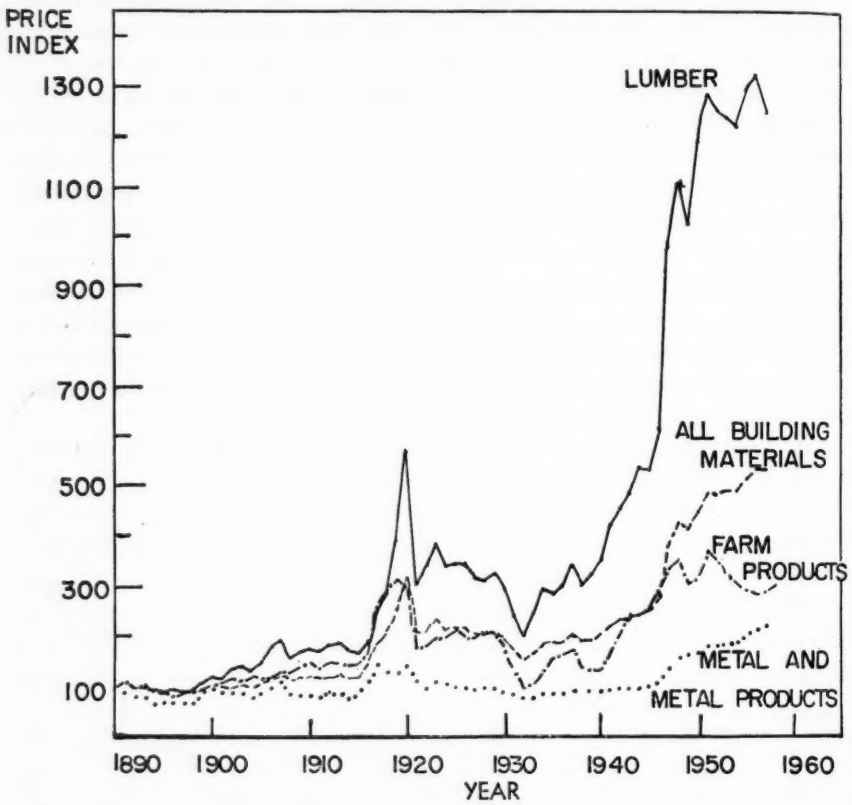

FIGURE 2. WHOLESALE PRICE INDICES FOR LUMBER, ALL BUILDING MATERIALS, FARM PRODUCTS, AND METAL AND METAL PRODUCTS, 1890-1958. (1890 = 100) (SOURCE: ZAREMBA, *J., Economics of the American Lumber Industry.* UNPUB. MANUSCRIPT)

to offset the technological gains this industry is likely to make. The widespread interest in sawmill automation may be partly justified, but three factors should be considered in evaluating the effects of automation: (1) The trend toward automatic handling of lumber is limited to a few mills, but the publicity resulting from it has given the false impression of substantial headway. (2) Lumber does not lend itself as readily to automatic handling as flow materials such as oil, steel, aluminum, and plastics. In these industries automation will undoubtedly be widely applied, leading to more rapid advances in productivity than those possible in the lumber

industry. (3) Productivity gains are correlated closely with expenditures for research and development.

The relatively small sums available for research, development, and extension in the lumber industry raise grave doubts about the ability of the lumber industry to keep up with competing industries. Therefore, the trend of lumber prices will likely continue upward at a rate equal to the

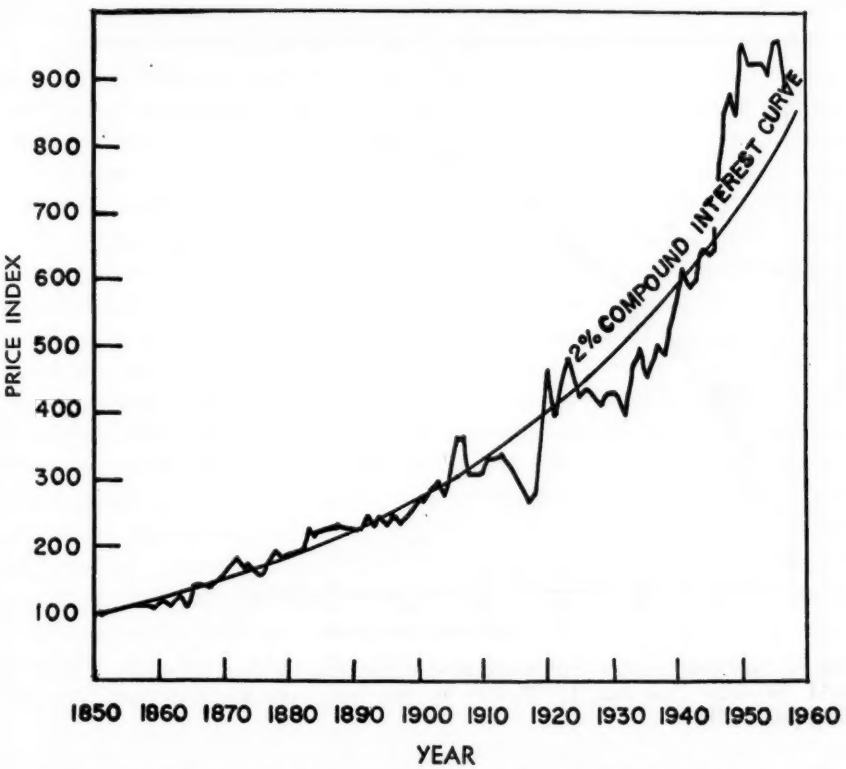

FIGURE 3. DEFLATED LUMBER PRICE TREND, 1850-1958. (1850 = 100)

productivity growth rate of the economy, or about 2½ percent annually. A continued long-time rise in lumber prices will force a change in the habits of lumber users, architects, and others, and stimulate research into newer and cheaper substitute materials. Both the Forest Service and the Stanford Research Institute in recent forecasts of lumber requirements have allowed for some displacement of lumber by competing materials as a result of price.[7]

While the behavior of price will tend to retard lumber consumption in

[7] *Timber Resources for America's Future*, Forest Serv., USDA Rep. No. 14, 1958; *America's Demand for Wood*, Stanford Res. Institute, 1952.

the future, rising incomes will have the opposite effect. In the United States, income has shown a consistent long-run increase. Average family personal income in 1960 was estimated at $6,900, and real purchasing power increased 2.4 percent during 1959.[8] By 1970 family income in present purchasing power is expected to reach $10,500. Except for inferior goods, a rise in income will be followed by a rise in consumption, depending upon the income elasticity of demand.

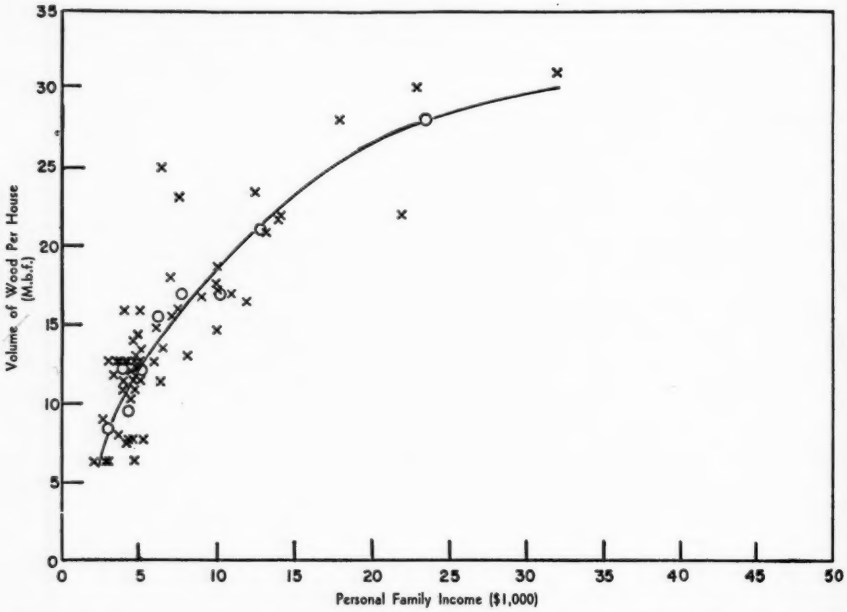

FIGURE 4. INCOME DEMAND FOR WOOD IN SINGLE-FAMILY HOUSES. NEW HAVEN, CONN., 1954. (SOURCE: ZAREMBA, J., "FAMILY INCOME AND WOOD CONSUMPTION," *Jour. of For.*, June 1961)

The derivation and use of income demand functions for agricultural commodities are well known. In the United States, the work of K. Fox, T. Schultz, and H. Working deserve special recognition. Within forestry, only one study of income demand for lumber has been published (see figure 4). This function was computed by cross-section analysis and shows the relationship between wood consumption in new single house construction and family personal income in the New Haven metropolitan area in 1954.[9] The income elasticity in the range of greatest interest is slightly less than 1. This relatively high elasticity is due to the strong desire by families for larger, one-story houses with an increased quantity of wood

[8] *Survey of Current Business*, U.S. Dept. of Commerce, May 1961, p. 11.
[9] Zaremba, J., "Family Income and Wood Consumption," *J. Forestry*, June 1961.

paneling. The stability of the income demand was tested by deriving a similar curve for 1940. The two curves coincide, indicating that, at least in New Haven, the income demand may be stable enough for use in forecasting wood requirements in construction.

An income demand curve for wood in residential construction for the entire country will slope upward, and there is some evidence that such a curve corresponds closely to the income demand for New Haven.[10] Assuming that family income will double by 1975 the average volume of wood per dwelling could rise from its present 12 M board feet to 19 M board feet. Whether family income will exert this much of an influence on lumber consumption, however, will depend upon the stability of the function. Downward revisions in preferences for housing expenditures and for wood in dwellings, and a continued rise in lumber prices, would give rise to downward shifts in the function itself, preventing income from raising consumption as much as otherwise. During the past decade, rising income was not followed by an increase in aggregate lumber consumption, suggesting that the income demand for all lumber did shift down for the country as a whole, even though in New Haven the income demand for lumber in construction appeared to remain stable.

Expanding population will also tend to increase lumber consumption. The main effect of rising population is to increase the number of households requiring food, shelter, household items of all kinds, and numerous other goods and services, many of which require wood. The earth's population is approaching 3 billion inhabitants, and with the widespread application of presently-known farm technology it is claimed that sufficient resources exist for 28 billion people.[11] In the United States population tends to increase 20 percent each decade. Today's seedlings will reach maturity at a time when the Nation's population will be from two to three times its present size.

The effect of population growth upon dwelling unit requirements is illustrated by the most recent estimates of lumber requirements by the Forest Service of USDA. The annual requirements for new dwellings is currently about 1.2 million. By 1975 it will be 2.0 million units, and by the year 2000, 3.0 million units.[12]

While price, income, and population all profoundly influence lumber consumption trends, in the long run, consumer preference could be the decisive determining factor. In recent study of preferences for lumber and substitute materials on house exteriors in New Haven and Delaware County (near Philadelphia), it was shown that preference relegated the influences of price and other demand determinants among homebuyers'

[10] Zaremba, J., *Ibid.*
[11] St. John-Stevas, N., "The Population Explosion," *Jubilee,* May 1961.
[12] *Timber Resources for America's Future, op. cit.*

choices to a secondary role.[13] In both areas a high rank correlation was found to exist between preference and ownership of materials.

Preferences have special significance because they can be altered by the industry, by product improvement, and advertising. But the importance of preference and the possibility of altering preference in lumber's favor have been almost totally neglected. The National Lumber Manufacturers Association 3 years ago, began a national wood promotion program in which about $1.5 million was spent last year. Allied Associations and a handful of lumber producers also advertise, but, even so, lumber promotion is several decades behind the economy and competing industries. With regard to product improvement, there are numerous problems in great need of attention. The reasons for the lack of emphasis on research and development, as well as promotion, is found in the structure of the industry. Firms which have only a small share of the market and which sell an undifferentiated product have little incentive to spend money for these purposes. The lumber industry corresponds closely to the classical concept of perfect competition; the concentration of production is almost the lowest of any industry in the economy.

The lack of emphasis on research and development is the most discouraging factor in the future of the lumber industry. In addition to raising productivity, research and development is the most important factor shaping preference. The task of maintaining and improving lumber quality is complicated by still another factor: The volume of high-grade sawtimber is steadily declining, although in the lower South there is some indication that sawlog quality is improving somewhat. The crux of the difficulty which faces the lumber industry may thus be summed up as follows: The improvement in quality of lumber and consumer products, which is the key to the future lumber market, must somehow be achieved in the face of a steadily declining volume of high-grade sawtimber.

There is no assurance that lumber consumption will increase as the economy expands. Since World War II lumber output has varied between 35 and 40 billion board feet annually. Rising income and population will continue to enlarge lumber demand, but their influences on consumption will tend to be offset by a continued rise in lumber prices. Consumer preferences can be altered in lumber's favor by research, development and promotion, but not at present levels of expenditures.

Factors Influencing the Consumption of Southern Pine Lumber

Turning now to southern pine, rising income and population will tend to enlarge the demand for pine lumber as for all lumber. But the relative influences of income and population will depend upon the comparative rates of growth in the South and the border States, where virtually all

[13] Zaremba, J., "The Consumer's Attitude Toward Lumber in Exterior Walls of Houses," *J. Forestry*, Feb. 1959.

southern pine lumber is marketed, and in the remainder of the country. Population growth by regions is as follows:

	Percent increase in population	
	1940–1950	1950–1960
United States	14.5	18.5
Northeast	9.7	13.1
Northcentral	10.8	16.0
South	13.3	16.5
West	40.9	40.0

SOURCE: U.S. Dept. of Commerce, Bureau of the Census

The population growth-rate in the South has been below average, and in adjacent eastern markets the rate has been the lowest in the country. On the other hand, the West, where virtually no market for southern pine exists, has experienced the highest growth rate in the country. If these rates continue, the influence of population upon the consumption of southern pine lumber will be less than its influence upon the consumption of all lumber.

The South has the lowest per capita income of any region in the country. In 1957 average income per head in Kentucky, Tennessee, Alabama, Mississippi, North Carolina, South Carolina, and Georgia was $1,280 compared with $2,027 for the country.[14] Between 1929 and 1958, however, per capita money income in the South increased 260 percent compared with 190 percent for the United States, and the rate of increase in the South will probably continue to rise faster than the National average rate. The increase in income will tend to increase the demand for southern pine lumber at a faster than average rate.

Besides regional differences in growth rates of income and population, the consumption of southern pine lumber will be influenced by trends in prices of this lumber relative to prices of competing wood. Douglas-fir is the largest competitor of southern pine, although spruce, hemlock, white fir, and Ponderosa pine are important secondary competitors. Since the available data on productivity and prices pertain mostly to southern pine and Douglas-fir, this analysis will be confined to these two species.

The lumber industry is one of the most labor-intensive industries in the U. S. economy, with a ratio of labor to fixed capital (excluding profits) of about 8:1.[15] The number of man-hours per $1,000 of value added by manufacturer in 1957 was 325, compared with 175 for all manufacturing and 85 for chemical products.[16] Thus changes in wage rates have a great

[14] *Statistical Abstract of the United States Department of Commerce*, 1959.

[15] Zaremba, J., *Economics of the American Lumber Industry*, unpublished manuscript.

[16] Zivnuska, J., "The Forest Products Mix in a Changing Economy," *Proceedings of the Society of American Foresters Meeting*, 1960.

impact on lumber prices, and regional difference in wage rate trends will have a relatively large influence upon regional differences in lumber price trends.

The average hourly wage in sawmills and planing mills in the South in 1959 was $1.27 compared to $2.44 for the Douglas-fir lumber industry.[17] However, wages are increasing faster in the South. From 1935-39 to 1959, hourly wages in southern sawmills increased 480 percent compared with 300 percent for the western sawmill industry.[18] The ratio of wages in the South to those in the West increased, during this period, from 0.37 to 0.53 and this trend is likely to continue as minimum wage laws take effect and as industrialization of the South proceeds.

Stumpage is the secod most important cost in lumber manufacturing, currently accounting for about a fourth of f.o.b. mill prices of both southern pine and Douglas-fir. In 1955 average Douglas-fir stumpage from national forest timber sales was $28.90 per M b.f. compared to $32.00 for national forest sales of southern pine.[19] But during the period 1935-1939 to 1955-1959 Douglas-fir stumpage prices, as reflected in national forest timber sales, increased 1,410 percent in comparison to 490 percent for southern pine.[20] Since much of the fir stumpage consisted of peelers, however, the increase in fir sawtimber stumpage is not nearly as great. Nevertheless, it is reasonable to assume that as the old-growth in the West is depleted and as the pine timber supply increases, stumpage prices in the South will not increase so fast in that region as in the West.

Despite the low wage rates in the South, prices of southern pine dimension (No. 1 common) f.o.b. mill averaged $95/M b.f. in 1958 compared with $76/M for Douglas-fir dimension.[21] The explanation for the relatively high southern pine lumber prices with low wage rates is found in regional differences in labor productivity. A U.S. Department of Labor study in 1935 revealed that labor requirements in logging and milling southern pine was 30.7 man-hours/M b.f., twice as high as the 15.4 man-hours in Douglas-fir production.[22] This survey included mills which produced 12 percent of the estimated lumber production in the country in 1935.

Trends in productivity, in addition to trends in stumpage prices and

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[17] U.S. Dept. of Labor, *Employment and Earnings.*

[18] U.S. Dept. of Labor, *ibid.* Also, *Wage Structure, Lumber in the South,* Series No. 76, Sept. 1950; *Wage Structure, Southern Sawmills,* Report No. 130, April, 1957; and West Coast Lumbermen's Assn., *Statistical Yearbook, 1952.*

[19] 85th Cong., 1st Session, House Document No. 195, *Price Trends and Relationships for Forest Products,* 1957.

[20] U.S. Forest Serv. and Commodity Stabilization Serv., *Demand and Price Situation for Forest Products,* 1960.

[21] U.S. Dept. of Labor, Bur. of Labor Stat., *Wholesale Prices and Price Indices,* 1958.

[22] U.S. Dept. of Labor, Bur. of Labor Stat., "Labor Requirements in Lumber Production," *Monthly Labor Review,* May 1937.

wage rates, will affect price trends of southern pine and fir lumber. A productivity study in 1946 reveals that labor requirements in southern pine logging and sawmilling increased from 30.7 to 41.2 man-hours/M b.f. from 1935 to 1947,[23] and in Douglas-fir from 1935 to 1949 the increase was from 12.4 to 15.6 man-hours. There are no comparable data since 1949. It is reasonable to assume, nevertheless, that labor requirements have not been altered in favor of southern pine to any great extent, if at all.

Since southern pine sawtimber quality and stocking will soon reach their lowest point, if they have not already done so, technological progress could give rise to an increase in productivity in pine sawmilling in the future. On the other hand, it is highly probable that productivity in Douglas-fir lumber production will decline as the transition to a young growth economy continues. Thus it seems safe to conclude that productivity in southern pine will increase relative to Douglas-fir.

The competitive position of southern pine relative to Douglas-fir in northern markets will be influenced by still another factor, namely transportation rates. Roughly 51 percent of the Nation's lumber is distributed by rail, 3 percent by water, and the remainder by truck. For comparative purposes, rail freight rates are quoted for lumber shipped from Hattiesburg, Mississippi, to New York City, and from Seattle to New York, the distance from Seattle being more than twice that from Hattiesburg. In 1920 the cost of transportation from Hattiesburg to New York was $9.75/M b.f.—53 percent of the $18.40/M for shipping fir from Seattle to New York.[24] By 1956 the cost for shipping pine increased to 73 percent of that for transporting fir from Seattle. Thus transportation costs have tended to weaken the competitive position of southern pine lumber relative to western lumber in common market areas. At the same time, it is reasonable to assume that a more equitable system of freight rates for lumber will be put into operation in the future.

For sheathing, studs, rafters, forms of all kinds and numerous other uses, relative prices of lumber are the major determinants of choice of species. But southern pine must also compete with other species on the basis of wood structure, manufacturing qualities, and general merchandising.

Strength properties of southern pine exceed those of Douglas-fir by as much as 50 percent for the structural grades, and by much higher percentages for comparable grades of hemlock, larch, and other secondary species.[25] Southern pine is the Nation's strongest softwood and thus has great utility for joists, rafters, beams, RR car construction, scaffolding,

[23] U.S. Dept. of Labor, Bur. of Labor Stat., "Labor Requirements in Southern Pine Lumber Production," *Mon. Labor Review*, Dec. 1946.

[24] 85th Con., Ist Session, *op. cit.*

[25] National Lumber Manufacturers Assn., *National Design Specifications*, 1960.

sub-flooring, and other uses. This advantage is offset somewhat by the tendency for southern pine to split when nailed. This is important in house construction, but in glued laminated beams, which are fastened by bolts and glue, this splitting tendency is unimportant.

The relative hardness of southern pine places it at a disadvantage as a finish material, either painted or unpainted. The springwood, being soft-textured, wears away easily, leaving the dense summerwood protruding. This results in a ridged surface which is particularly noticeable in flat-grained southern pine lumber. Dense summerwood, together with its high resin content, does not make southern pine a good material upon which to apply paint and other finishes.

Southern pine has a great tendency to warp and split upon drying, and even during changes in moisture content of the atmosphere. It is more susceptible to decay and stain than Douglas-fir and when not seasoned properly it acquires a blackish appearance in storage. On the other hand western wood, much of which still comes from old-growth, does not warp excessively upon drying and can be put in place in a green condition.

Thus where stength is the prime consideration southern pine will tend to be favored over its competitors, assuming, of course, that all species are merchandised properly and that the desired grades are consistently available. When considering actual manufacturing and merchandising practices, the strength advantages of southern pine seem less significant. Much of western lumber shipped east is milled in large, relatively efficient mills, and is graded, and in many cases packaged and distributed, by an efficient sales force. A substantially higher proportion of southern pine comes from small mills, ungraded, unpackaged, and often in a green condition. As a result, the public has placed great confidence in western wood, even in the South itself. Thus when lumber manufacturing and merchandising are considered along with productivity, wage rates, stumpage prices, and transportation costs it is relatively easy to understand how the weak competitive position of southern pine has developed.

Factors Influencing Pulpwood Consumption

While per capita consumption of lumber has declined since the early 1900's, per capita consumption of pulpwood has increased from 0.044 cord to 0.181 cord annually from 1910 to 1954.[26] This increase is due to the high positive correlation that exists between consumption of paper, paperboard, and other products made from pulpwood, and per capita income. This relationship between consumption and income is so close that it provides the main basis for projecting future requirements of pulpwood. A recent study shows that 90 percent of the variation in per capita con-

[26] *Pulpwood Industry Facts*, 1956 edition.

sumption of paper in 1956 among 48 countries is explained by differences in net per capita income.[27] Studies conducted by the Food and Agriculture Organization of the United Nations reveal that the income elasticity of demand for newsprint lies between 2.5 and 3.0 in countries with national incomes below $100 per head; it falls to about 1.5 at incomes of $400 and $600 per head; and approaches 1.0 at incomes of over $1,000 per head.[28] For other paper and board categories the fall is steeper, and at the highest levels of income as in the United States and the Scandinavian Countires, elasticity for certain categories seems to fall below 1.0

Productivity growth in the pulp and paper industry has kept pace with that of the economy. Consequently, real prices of paper and paper products have remained approximately constant, and quality of paper products has also been maintained. With progress in productivity and quality, the products of this industry have not been seriously threatened by substitute materials.

The rapid increase in per capita income expected to occur in underdeveloped countries as well as in advanced countries will give rise to substantial increases in requirements for pulpwood. The potential demand for pulpwood is more fully appreciated when considering that per capita consumption of paper in the United States in 1956 was 432 pounds while in most of South America, Asia, and Africa it was below 20 pounds per head.[29] In India it was 2 pounds. It is a fair generalization to state that no low-income country will reach higher levels while maintaining low paper and allied product consumption levels. One of the major reasons for this is that, as the literacy of a population rises, educational needs alone will produce demands for paper for numerous uses. The increase in per capita requirements, of course, will be reinforced by population growth.

Factors Influencing Southern Pine Pulpwood Consumption

In 1960 southern pine accounted for 50 percent of the total pulpwood (softwood and hardwood) production in the United States, and 63 percent of total softwood production.[30] Many indications point to a further increase in southern pine's share of the pulpwood market. Since World War II 70 percent of the Nation's pulp mill expansion occurred in the South,[31] and 67 percent of the plant capacity under construction or announced as of August, 1960 was located in the South.[32] Per capita consumption of

[27] Meissner, F., "Pin Pointing Export Markets," *Pulp and Paper, 1958 Review Number*, July 10, 1958.

[28] Glesinger, E., 'The Role of Forestry in World Economic Development," a talk delivered to the Fifth World Forestry Congress, Seattle, Sept. 1960.

[29] Meissner, F., *op. cit.*

[30] *Demand and Price Situation for Forest Products, op. cit.*

[31] *Pulp and Paper Review, 1958*, July 10, 1958.

[32] *Demand and Price Situation for Forest Products, op. cit.*

paper and paperboard in United States is expected to increase from 420 pounds in 1955 to 558 pounds in 1975, and 750 pounds in the year 2000.[33] To meet the demands of rising income and population, requirements for paper and paperboard are expected to increase 74 percent by 1975, and between 200 and 300 percent by 2000.[34] Sixty-four percent of the increase is expected to be in the sulfate and semi-chemical processes, the main processes used for pulping southern pine.

The production of pulp requires a heavy capital investment, a large supply of water, and an abundant supply of pulpwood. Capital is sufficiently mobile so that no region has an advantage over any other region in capital availability. Water also exists in sufficient quantities throughout the East, and in many areas in the West. But pulpwood, which delivered at the mill represents about half the cost of finished pulp, varies greatly among regions. The regional variation in pulpwood supply is not so much a difference in stumpage prices as in the cost of labor required to harvest and deliver pulpwood to the mill. To illustrate, in 1955 southern pine pulpwood stumpage averaged $4.00 per cord, and in the Lake States, spruce was also $4.00 per cord.[35] But southern pine pulpwood at local delivery points averaged $16.50 per cord in 1960, while spruce in the Lake States averaged $26.75.[36]

As already noted, the South's advantage in labor costs is declining. This is also indicated by the fact that from 1940 to 1960 the delivered prices of southern pine pulpwood increased 293 percent compared to an increase of 190 percent for delivered prices of spruce and aspen pulpwood in the Lake States.[37] Nevertheless, the South's advantage in labor cost is still substantial, and this region should maintain its competitive advantage in pulpwood production for some time to come, particularly in view of the favorable timber supply outlook. Mechanization of pulpwood operations could increase southern pine's competitive position even more, since southern pine management and the terrain supporting pine forests are more conducive to mechanized and yearlong operations than those of other species.

The increasing use of residue, chiefly sawmill chips, however, is slowing the rate of growth in the demand for southern pine roundwood. In 1940, 2 percent of the pulpwood consumed in the entire country came from residue; in 1950, 5.3 percent; and in 1960 18 percent was derived from this material.[38] Since 1956 over half of the increase in requirements for pulpwood in the South was supplied by residue. Complete recovery of all residue would yield 60 percent of the Nation's pulpwood require-

[33] *Timber Resources for America's Future, op. cit.*, p. 433.
[34] *Ibid.*
[35] *Price Trends and Relationships for Forest Products,* 1957, *op. cit.*
[36] *Demand and Price Situation for Forest Products, op. cit.*
[37] *Ibid.*
[38] *Ibid.*

ments.[39] However, problems in collecting it may prohibit the realization of more than half of all that available, enough for 30 percent of the Nation's requirements for pulpwood. An increase in requirements of southern pine pulpwood of 60 percent within the next decade could possibly be satisfied with no more than a 30 percent rise in the requirements for southern pine roundwood.

Summary

This paper has discussed how various factors will tend to affect the consumption of southern pine roundwood. Since about 90 percent of pine roundwood is processed into lumber and pulpwood, the discussion was further restricted to these two products.

Rising personal family income and population provide the main basis for optimism regarding future lumber markets. However, rising price and changing consumer preference appear to have offset the favorable influence of income and population growth during the last few decades. Expansion of the lumber market hinges upon a substantial increase in expenditures for research and development to improve the quality of lumber and wood products and to lower production costs. The lumber industry is so far behind other industries in research and development expenditures that the present lumber situation should not be surprising.

The position of southern pine lumber relative to lumber in general has deteriorated. Pine lumber has lost most of its foreign markets, and its domestic markets outside the South have been largely taken over by other species. In the future, rising population will affect the consumption of southern pine lumber to a smaller degree than for all lumber, while rising income will probably exert a greater than average influence. Rising labor costs will definitely continue to worsen the price position of pine lumber; while stumpage prices, productivity, and transportation costs will probably be neutral in their influences upon relative southern pine lumber prices. But the weak market position of southern pine lumber is due in large part to below average manufacturing and merchandising practices. Thus the key to the improvement in pine lumber lies, as for all lumber, in better manufacturing and distribution practices.

The rapidly growing market for southern pine pulpwood stands out in sharp contrast to the shrinking lumber market. Productivity and output of the pulp and paper industry has kept pace with the expansion of the economy. Rising income and population will give rise to a steady increase in requirements for pulpwood in the future. The increasing pine timber supply and the prospects for mechanical handling of southern pine pulpwood may lead to a further increase in southern pine's share of the pulpwood market. The use of wood residue is the principal factor retarding the growth in demand for southern pine roundwood for pulpwood.

[39] Zivnuska, J., "Trends and Prospects in the Pulp Industry of the U.S.," *Saetrykk av Norsk Skogindustri* nr. 3, 1955.

DISCUSSION: FACTORS INFLUENCING THE CONSUMPTION OF SOUTHERN PINE

FRED S. HOPKINS, JR.
Iowa State University

The paper we have just heard brings together a number of the contributions Professor Zaremba has made in the area of timber products demand, price, and consumption. He has directed the attention of forest economists to a number of significant relationships that bear substantially on forest resource development and planning.

Zaremba indicated that the demand for southern pine, in the form of both lumber and pulp products, can be expected to rise. The basis for this tendency lies chiefly in the anticipation of upward trends in population and income. A third determinant of demand, consumer preference, is critical, but can be forecast with less assurance. In the case of pulp and paper products, preference may add to the upward pressures on demand exerted by rising population and income. For lumber, on the other hand, weakening preferences may tend to modify the effect of other determinants. It remains to be seen how the lumber industry's recent aggressive measures to improve and promote their product will affect the demand for southern pine lumber.

While the prospect of rising demand for southern pine was established, Zaremba's paper went well beyond the subject of demand. In turning from demand to consumption, that is bringing supply into the picture, the prospect we are given for southern pine lumber is drastically altered. Because of lagging productivity in the industry, supply is expected to continue to diminish. Even though demand will tend to rise, it is not anticipated that consumption will change appreciably. Unless rather drastic technological changes occur, consumption will be severely inhibited by steadily rising prices. Thus, the position of the southern pine lumber industry differs appreciably from the pulp and paper industry in which a fairly steady flow of technological advancements have the effect of increasing supply as demand rises.

On the whole, the evidence Zaremba has brought together seems to indicate growing consumption of southern pine roundwood. Pulp products will undoubtedly comprise an increasing proportion of the volume of southern pine utilized. Within the lumber category, structural and similar applications may assume increasing significance relative to finish materials.

In early projections of demand for timber products, greatest emphasis was placed upon population as the principal determinant of demand. Such estimates tended to be in error, generally on the conservative side, largely because forecasts of population growth were low and the positive effects of other factors were disregarded. On the basis of a rather limited

sample, Zaremba demonstrated a positive, though inelastic, correlation between income and the quantity of lumber used in residential construction. It should be recognized that the relationship between income and consumption is not necessarily positive. The preferences of consumers may be such that, with higher incomes, they find it possible to utilize other materials which, though more costly, are more desirable in their eyes.

Preference is perhaps the most interesting determinant of demand, though undoubtedly the most difficult to predict. To the extent that preference is a matter of custom or convention, it may not be a serious hazard in forecasting demand. There is evidence that consumers have a strong attachment to wood in many forms. Preference is also associated with utility or aesthetic attributes. The evaluation of whatever qualities in a commodity are considered important by consumers is highly subjective. Attributes rated high by a consumer may be real or imagined. Thus, preference for lumber may weaken if consumer opinion should shift in favor of substitute materials. This is probably the factor most severely limiting the expansion of demand for lumber in the past.

In considering preference for lumber, we tend to focus our attention on consumer choices between lumber and materials which are close substitutes for lumber. It is important to recognize, however, that goods and services which serve entirely different purposes are also substitutes for lumber and bear substantially upon the strength of consumer preference for that commodity. In fact, preference for lumber may well have been weakened more seriously by such things as automobiles, television, education, and recreation, than by competing physical structure materials. Furthermore, demand for many of these more remote substitutes is more vigorously influenced by producers than in the case of lumber.

Zaremba pointed out that preference is subject to positive influence by the producers concerned. In the case of lumber, where the product is undifferentiated, there is little to be gained by attempts to exert such influence on the part of the individual firm. Promotional efforts to strengthen consumer preference for lumber are being made by trade associations representing major segments of the industry and particularly by the N.L.M.A. representing the industry as a whole.

In speaking of the lumber industry, Zaremba placed considerable emphasis on the matter of labor productivity. It seems that several factors may have a favorable effect upon productivity. One lies within the realm of timber management. The pattern by which old growth timber was exploited is well known. The margins of availability were steadily pushed back with less accessible timber and timber of smaller size and poorer quality being harvested. In the later stages of this process, timber harvesting frequently became a scavenging operation in which young growth and what had previously been left behind was utilized. With no substanital change in technology, it is apparent that the labor required

per unit of volume, both in the forest and in the mill, would tend to rise.

Our long term experience has been that technological advances have been just about sufficient to offset the changing character of the timber being used. Relative both to the past and to the West, timber in the South is quite accessible in a locational sense. The intensity of timber management, in terms of both capital and labor inputs, has been steadily rising. The effect of the adjustments which have occurred should be more accessible timber of larger size and better quality, all tending to increase output per man hour. Inasmuch as these changes are accompanied by technological improvements in harvesting and in milling, some of which have been especially significant in the last decade, it does not seem unreasonable to anticipate a distinct upward trend in productivity.

Recent developments may also bear on mill size. Devices such as the riderless carriage and the automatic trimmer developed to facilitate lumber production entail substantial capital investment. Small mills are subject to more severe competition by those mills which are in a position to adopt engineering improvements. The increased advantage of the latter would be evident in bidding for stumpage and in processing costs. The significance of the very small mill in the structure of the lumber industry may tend to diminish.

I agree with Zaremba that productivity in the lumber industry is unlikely to keep pace with the rising productivity of the economy as a whole. I do believe, however, that there is a very real possibility of a distinct upward trend in labor productivity in the lumber industry. Following Zaremba's reasoning, this would lead to the conclusion that the trend of real lumber prices would rise less steeply in the future than the 2 percent rate experienced since 1900.

Zaremba's long-term price trend thesis has been extremely valuable, particularly in throwing light upon the significance of productivity in the wood-using industries. It tends, however, to explain price changes entirely on the basis of decreasing supply. There is little question that part of the upward trend in real lumber prices stems from rising demand, which in turn, is attributed largely to rising population and income. For supply to account for the major portion of price increases, price demand must be comparatively inelastic and the increase in demand relatively small.

Fabricant's studies in productivity, which were cited by Zaremba, show a 2 percent rise in productivity in the wood-using industries, exclusive of paper products, between 1899 and 1939 and a 75 percent rise between 1899 and 1953. Assuming that the data are comparable, this suggests a 4 percent annual rate of increase in productivity between 1939 and 1953. Among the industries included, veneer and plywood probably advanced in productivity more rapidly than lumber, but this distinctly suggests progress on the part of the lumber industry. More information on productivity would be of considerable value.

One of the most valuable applications of Zaremba's work in the price trend area is in presenting the case for expanded research effort in forestry and wood products conversion. If the upward trend in the real prices of such timber products as lumber is to be modified, productivity must be increased. Rising productivity is, to a large extent, the product of research. Since firms within the industry are not in a position to undertake research on the necessary scale, it must be provided by other industries or by public agencies. This is essential if increased consumption at constant, or less rapidly rising, real prices is to be achieved. Zaremba compared productivity trends in agriculture with those in the lumber industry. The two industries are similar in that they are competitive, and characterized by the predominance of small firms. The magnitude of research in agriculture has, however, been tremendous. This research has been accomplished almost entirely by public agencies and by firms outside of agriculture.

Reference was made to the growing use of wood residues by the pulp and paper industry. While this trend would have a negative effect on the demand for southern pine roundwood by the pulp and paper industry, it would have some tendency to increase the lumber industry's demand for southern pine. A sawmill which produces chips as a joint product with lumber would tend to increase output. This development also gives the medium or large mill a small additional advantage over the small mill.

In concluding this discussion of Zaremba's paper, I would like to turn your attention to the basic need for further study in this area. Forecasts of demand, however crude, are essential to any planning for production. Such projections are implicit in any decision made by a public agency or private firm concerning future production. The point that is rather unique in the case of timber production is the long time periods over which estimates of demand are required. Much planning is based upon forecasts of demand forty years or more in the future. The fact that such long-range projections are subject to large error does not reduce the necessity of making them.

Presumably, one of our major objectives is to achieve a reasonably close approximation of an optimum allocation of resources to timber production. Current policy, and perhaps the tradition of conservation, suggest that underinvestment is the dominant characteristic of timber resource management. This being the case, we are primarily concerned with how additional resources can be employed most productively, and not with the possibility of excessive investment in timber production.

As our ability to forecast demand improves, we shall have at our disposal better guides to resource allocation. The uncertainties associated with long-term production will be reduced, though by no means eliminated. There is clearly a tremendous need for more research along lines Dr. Zaremba has followed in the area of demand for timber products.

CONTRIBUTED PAPERS: FARM MANAGEMENT AND PRODUCTION ECONOMICS

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HOW HAVE ACREAGE-CONTROL PROGRAMS AFFECTED CROP YIELDS?

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IT IS often said that acreage allotment and marketing quota programs have not been effective in curtailing crop production because farmers increase yields on the acreage remaining in use by applying more fertilizer and other inputs or by adopting improved production techniques. This proposition is not supported by normative economic analysis. Presumably, if it were economic to apply more inputs per acre or use new production functions, it would be economic to do so whether or not acreage restrictions were in effect. But more important is the fact that empirical evidence also raises doubts concerning the truth of this proposition.

The total harvested acreage of the five quota crops (wheat, cotton, rice, peanuts, and tobacco) decreased by a third from 1952 to 1955 under acreage-allotment and marketing-quota programs (figure 1). The composite yield index went up nearly 30 percent, but aggregate production for these crops decreased 12 percent. The remarkable rise in yields of the quota crops during this period was probably due chiefly to land selection or retention of the most productive land in these crops.

Contrary to popular opinion, per acre yields have gone up much less for quota than for other field crops since 1955. The composite yield index increased less than 10 percent for quota crops as compared with 33 percent for nonquota crops from 1955 to 1960. Corn is included with nonquota crops since it never was a quota crop and allotments for corn were discontinued after 1958.

Why the much greater increase in yields for nonquota than for quota crops since 1955 when acreages of the two groups changed very little? Apparently, economic possibilities for improving yields for quota crops were more fully utilized by 1955, than those for improving yields of nonquota crops. In recent years fertilizer use has increased more for nonquota than for quota crops.

There is little basis for the widespread belief that high prices under price support programs have caused yields of quota crops to increase during the 1950's. Actually, prices received by farmers for the quota

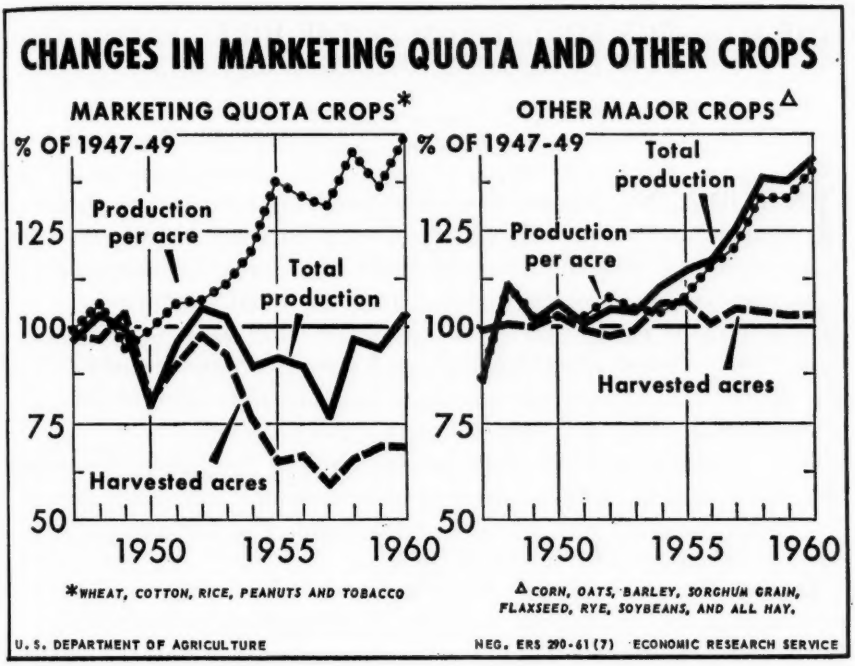

FIGURE 1

crops averaged about 10 percent lower in 1960 than they did in 1952. Farm prices of the nonquota crops decreased about 30 percent from 1952 to 1960, when total production of these crops went up 37 percent.

Acreage controls cannot be dismissed as a totally ineffective method of curtailing crop production. If additional reductions in acreages of quota crops had taken place after 1955, reduction in production of these crops probably would have been nearly in proportion to reductions in acreages. Fewer acres of quota crops would have made more land available for growing nonquota crops and probably would not have solved the overall surplus problem. But acreage diversion has not been the main source of expansion in production of the nonquota crops. From 1952 to 1960, the harvested acreage of nonquota crops went up only 5 percent while yields went up 30 percent, indicating that higher yields were several times as important as larger acreages in bringing about surpluses of feed grains and other nonquota crops.

THE LONG-RUN EQUILIBRIUM IN THE HIRED FARM LABOR FORCE: HISTORY AND IMPLICATIONS

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INTRODUCING Nerlove-type distributed lag models into structural demand and supply relations for hired labor[1] will identify the long-run relations of firms and members of the labor force. The long-run relations can be solved for the reduced form for hired employment which may in turn be used to compute historically what the long-run equilibrium[2] level of employment has been each year. A comparison of this with the actual level of employment illuminates one dimension of the labor adjustment problem and how it has changed over time.

Such comparison shows that through most of the period since 1929 the actual level of employment of hired farm labor has been greater than the long-run equilibrium level of employment. The two exceptions are 1934 and the period from 1946 to 1949.

During the entire period, including years when actual employment was short of the equilibrium, the average disequilibrium was 6.2 percent. Considering only the years when actual employment was in excess of the equilibrium level, the average disequilibrium was 6.7 percent.

If attention is focused on shorter periods of time, there are roughly three periods when the agricultural labor force was seriously in excess of its equilibrium level. The first period includes the years 1929-31, when the percent of disequilibrium ranged from 7.6 percent to 14.5 percent. From 1937 to 1942 inclusive, was a longer period in which the actual level of employment was over 5 percent in excess of its equilibrium level. The third period includes the years 1952 to 1959. The percentage discrepancy in this period was larger than the 1937-42 period, and approaches the degree of disequilibrium incurred in the earlier 1929-32 period. In 6 of the 8 years in the recent period, the degree of discrepancy was roughly 10 percent or greater, and progressively widened in the period to a peak of 16 percent in 1959.

The coefficient of adjustment for the employment reduced form, which

[1] A description of the structural model on which this analysis is based may be found in the author's doctoral dissertation, "An Econometric Investigation of the Market for Hired Labor in Agriculture," unpublished, Univ. of Chicago, 1961, and in a forthcoming article in *J. Farm Econ.*

[2] Care must be exercised in not reading too much normative content into this equilibrium concept. It indicates only where demanders and suppliers would be if they took current information seriously and adjusted completely to it. In the farm labor market, where conditions have been such as to require essentially a continuous transfer of labor resources to nonfarm employment, there is relatively more normative content present.

summarizes the interactions of supply and demand, indicates that on the average 31 percent of the discrepancy between actual employment and equilibrium employment is removed in any one time period. This implies that it takes slightly over 8 years to remove 95 percent of the discrepancy between actual and equilibrium levels of employment, given an initial change and assuming that conditions remain at their initial changed position. A major portion of the adjustment is made in 2 to 3 years, however.

Historically, equilibrium levels of employment have in general been attained in from 1 to 2 years. Exceptions are the equilibrium levels of employment for the years 1929, 1931, 1938, 1939, 1940, and 1952 to the present. And only in the period from 1954 to the present has the actual level of employment lagged the equilibrium level by more than 3 years.

Two conclusions follow from this analysis. First, the persistence of the "farm problem" reflects the *continuing* need to transfer resources, or *to adjust to a dynamic equilibrium,* rather than to the failure of the adjustment to occur. Resources have moved, and they have moved quite rapidly in an absolute sense. Second, evidence was presented of an increasing disparity between actual employment and the long-run equilibrium level of employment in the period since 1953. It appears that the transfer process is becoming more difficult. In the 10-year period from 1936-45 the equilibrium level of employment declined 30 percent; the actual level of employment declined 29 percent. In the more recent 10-year period from 1950-59, the equilibrium level declined 26 percent, but the actual level of employment declined by only 17 percent. Clearly, the labor market is not performing as well in the latter period as it did in the former.

DECISION THEORY, CLIMATIC VARIABILITY, AND "BEST" SHORT-RUN MANAGEMENT STRATEGIES

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DECISION theory deals with decision-making in situations where the occurrence of various state of nature is uncertain. Two highly simplified management situations were used to illustrate how decision theory can be used to help select the "best" strategy.

Many choice criteria can be defined.[1] The Bayes Criterion, defines that strategy with the highest expected payoff as the "best" strategy. A variant of the classic Bayes Criterion will be used as the basic choice criterion in this paper. Subjective probabilities are attached to each state of nature on the basis of the relationship between dependent and independent variables. The attached probabilities will change as the information about the independent variable changes. The management problem of choosing (1) the "best" rate of stocking and (2) the "best" maturity class of corn to seed are used to illustrate how decision theory could be of value in choosing the "best" short run management strategies for situations involving climatic variability.[2]

Selecting a rate of stocking: Table 1 is the payoff matrix constructed for the rate of stocking problem.[3]

TABLE 1. GROSS RANCH PROFITS ASSOCIATED WITH THREE DIFFERENT RATES OF STOCKING AND FIVE DIFFERENT LEVELS OF RANGE PRODUCTIVITY

Rate of Stocking	Levels of Range Productivity (States of Nature)				
	I′	I	II	III	III′
	Dollars	Dollars	Dollars	Dollars	Dollars
A. Heavy	−4,000	605	7,645	11,389	11,389
B. Medium	− 200	2,833	7,165	8,527	8,527
C. Light	304	2,604	2,939	3,261	3,261

The prediction equation in footnote 3 was used to estimate the expected level of range productivity for two, three, and four inches of precipitation.

[1] Baumol, William J. *Economic Theory and Operations Analysis*, Prentice-Hall Inc., 1961, Ch. 19.

[2] For another discussion of decision theory, see McConnen, R. J., "Decision Theory and Range Livestock Operations" *3rd Proceedings of the Range Resources Committee*, Western Agri. Econ. Res. Council, Fort Collins, Colo., Aug. 11, 12, 1961.

[3] The basic data used to calculate this matrix was obtained from Wheeler R. O. and McConnen R. J., *Costs, Returns, and Organizational Characteristics—Three Sizes of Commercial Family-Operated Ranches—Northern Great Plains—1959*. Bul. 557, Mont. State College, Agr. Exp. Sta., Bozeman, Mont., 1961, and from a rate of grazing study conducted at the USDA Range-Livestock Exp. Sta. at Miles City, Mont. The functional relationship used to predict range productivity was $X_1 = a + b_1 \log_e X_3 + b_2 (\log_e X_3)^2 + b_3\sqrt{t}$, where X_1 is the level of range productivity, X_3 the precipitation in March, April and May, and $\sqrt{t}$ is trend variable recognizing the decrease in productivity over time on the heavily grazed pastures.

The standard error of estimate was used as the basis for attaching probabilities to the five levels of range productivity for the three levels of precipitation. The expected gross ranch profits for each of the three strategies for each of the levels of precipitation are presented in Table 2.

TABLE 2. GROSS RANCH PROFIT FOR EACH OF THE THREE RATES OF STOCKING AND THREE LEVELS OF PRECIPITATION

Rate of Stocking	4 Inches	3 Inches	2 Inches
	Dollars	Dollars	Dollars
A. Heavy	8,319	5,998	2,660
B. Medium	7,240	6,249	4,059
C. Light	3,024	2,878	2,503

Selecting maturity class of corn: Early maturing corn is generally regarded as most desirable in the Northern Great Plains. However, if "significant" precipitation occurs in August, late maturing varieties perform well.[4] The result of experimental work with early and late maturing varieties of corn at Huntley, Mont. is given in Table 3.

TABLE 3. YIELDS FOR CORN CLASSES A AND B DRYLAND AT HUNTLEY, MONT.

	Expected Average Yields		
	All States of Nature	State 1 No "Significant" Precipitation in August	State 2 "Significant" Precipitation in August (more than 1.2")
	bushel/acre	bushel/acre	bushel/acre
A. Early Maturing	24.8	22.4	39.3
B. Late Maturing	23.6	20.5	42.7

The long run probabilities attached to the two states of nature indicate that the seeding of Class A is the "best" of these two strategies. However, *if* long range weather forecasts (giving a forecast for August precipitation on May 15 in this case) were available, the probabilities attached to the states of nature would vary from year to year. If the probability attached to State 2 were greater than .36, Class B would be the "best" corn to seed.

Conclusion: The skill of meteorologists in forecasting climatic conditions can be expected to improve.[5] Agricultural economists in cooperation with other agricultural scientists and meteorologists can conduct research in an area which could have a major impact on the agriculture of the world. Decision theory should provide a basis for much of this work.

[4] The subject matter of agricultural ecology deals with "the study of the physical character of environment, climate and soil in relation to the development of agricultural plants and to the yield of such plants in quantity, quality and reproduction." (Azzi, Gerolamo, *Agricultural Ecology*, Constable & Co. Ltd., London 1956.) Decision theory is an attempt to deal with part of the environment as a dynamic rather than static concept.

[5] Petterssen, Sverre. "Expected Developments in Meteorology During the Coming Ten-Year Period" Bul. of the American Meteorological Society, Oct. 1960, Vol. 41, No. 10.

DECISION-MAKING CRITERIA FOR MAXIMIZING RETURNS TO FEDERAL GRANT LANDS

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STATEHOOD recognition to various geographic areas carved from the public domain has, in most cases, been accompanied by a Federal land grant. These grants have varied from 1 to 4 sections in each surveyed township. Earlier grants were given as compensation for withholding State taxation of Federal lands. Later grants were conveyed to provide economic support to the State school systems. Grant conditions provide for the sale of these lands but require that funds from their sale become a permanent asset of the State and that only the interest from the land or its sale funds be spent in school support.

State land agencies have two alternatives for maximizing returns from State lands. First, they can hold the lands under lease and receive rental revenues plus land appreciation (or depreciation) revenues through future sale. Secondly, they can sell the land for the current price, invest the funds, and receive interest and capital gain (or loss) returns. Also, additional tax revenues can be realized by removing these lands from tax-exempt status.

These alternatives and the criteria for choosing between them, based on strict revenue goals, may be formalized as follows. Alternative 1 (holding and leasing) may be expressed as:

$$K = \sum_{i=1}^{N} \left[\frac{L_i}{(1+I)^i} + \sum_{j=1}^{k} \frac{F_{ij}}{(1+I)^i} \right]$$

where:

K is the expected net discounted returns over a given number of years (N) from holding and leasing an acre of State land for the period.

$(1+I)^i$ is the discount factor.

$L_i/(1+I)^i$ is the expected change per acre in land value in any single year (i) discounted to the present and summed over a given period of time (N).

$F_{ij}/(1+I)^i$ is the expected net returns per acre to the Board from lease fees for all uses $j(j=1 \cdots k)$ in any single year (i) discounted to the present, and summed over a given time period (N). Sub-surface revenues can be excluded from the analysis since they are available to the state regardless of the alternative selected.

Alternative 2 (selling and investing) may be expressed as:

$$S_i = \sum_{i,f,g,h} \left[\frac{C_{if}}{(1+I)^i} + \frac{R_{ig}}{(1+I)^i} + \frac{T_{ih}}{(1+I)^i} \right]$$

where:

the summation is over i (1 to N), f (1 to p), g (1 to q), and h (1 to r).

S is expected net discounted revenues over a given number of years (N) from selling an acre of state land at the current sale price.

$C_{if}/(1+I)^i$ is the expected net change per acre in the fund created by sale of the land and invested in one or more securities (f) in any single year (i), discounted to the present and aggregated for the period (N).

$R_{ig}/(1+I)^i$ is the expected net interest returns per acre to the Board from the fund invested in one or more securities (g) in a single year (i) discounted to the present, and aggregated over the period (N).

$T_{ih}/(1+I)^i$ is the expected net returns from any tax (h) per acre levied on the land for a single year (i) discounted to the present and aggregated over period (N). If only direct Board funds are to be considered in the decision, general formula (2) can be altered to exclude the tax revenues.

The economic decision concerning the "sale" or "hold" alternatives is one of comparing the expected values of S and K. Where $S>K$ the sale alternative would realize the greater expected returns to the state by year N. If expectations are such that $S<K$, holding and leasing the lands would provide the greater returns.

In actual decision situations, the difference in the expected values of S and K may be small. The expected values are based on subjective estimates of the future. The decision regarding the size of the difference in the value of S and K necessary for sale, therefore, must be dictated by the probability of the subjective estimates being realized.

The formulas may be manipulated to serve as a decision making guide. By setting the formulas equal to each other, it is possible to determine the minimum value of any component necessary to realize equal revenues from the two alternatives, given the expected values of all remaining components.

AN APPROACH TO YIELD PROJECTION AND AGGREGATION

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TODAY'S problems require farm economics research applicable to important production situations, yet susceptible of aggregation regionally and nationally. An important aspect on the supply side is that of yield projection. Aggregative studies that look to the future rest largely on yield projections.

For crop production, estimates of yield response to a divisible input (fertilizer) are developed for different groups of soils at different levels of discrete technology. This is done by agricultural subregions in which there is considerable homogeneity as to factors that influence yield response. Work in Missouri and in the Georgia Piedmont furnishes some examples.[1]

In Missouri, more adequate use of fertilizer alone would have brought the State average corn yield per harvested acre in 1959 to nearly 70 bushels from 55, according to technicians' estimates. The range would have been from 57 to 78 bushels for the different subregions.

Work in yield projections is followed by use of programming models to bring the analysis into focus in terms of farms. Changing technology affects farm modes. As a step toward aggregation, we develop normative cost minimization solutions to indicate optimum sizes and organizations of farms for different income levels at different points on the technological scale. Both crop and livestock enterprises adapted in an area are included in the models.

A preliminary solution has been obtained for the Georgia Piedmont at present levels of technology except for fertilizer use at rates that would equalize marginal returns to all variable inputs. A corn-coastal bermuda rotation, rotation pasture, hay selling, and a hog enterprise, came into the solution at all operator income levels up to a maximum of about $8,000 permitted by the monthly labor restriction of 420 hours. At the highest income level, the hog enterprise was nearly eliminated, a calf-fattening enterprise became dominant, and sales of hay were subsantially reduced. Optimum farm size ranged from about 47 acres for a $1,000 operator net return (no hired labor) to 252 acres for a return of about $8,000 above all costs. Price and cost projections used in other work in the area were used in obtaining this solution. Enterprises included in the model but not appearing in the solution at any income level were corn (rye) and cotton (rye) rotations, a beef cow herd and a grain-buying activity.

[1] Econ. Res. Serv., Agr. Res. Serv., USDA, the Mo. and the Ga. Agr. Expt. Sta., cooperating.

Normative solutions of cost minimization models get us only to the threshold of aggregation. We can then develop projections of the number of farms and the number of acres we think may be operated at different income levels and at different levels of technology. These projections will need to take into account that there is a great range in managerial ability, and in other factors that determine progress in technology and in the distribution of farms among different income levels.

The work can be done in selected "benchmark" areas, to develop well-grounded yield projections, to aggregate by major regions the probable effects of changes in farm technology, and to indicate the effect of these changes on the competitive position of different regions in meeting production needs. The work provides an orientation through which information now available can be used in macro as well as in micro analysis. Emphasis on potentials provides a forward-looking analysis.

DO MARKET STRUCTURES INFLUENCE MARKET DEVELOPMENTS?

CHAIRMAN: STANLEY K. SEAVER, UNIVERSITY OF CONNECTICUT

A THEORETICAL SCAFFOLDING FOR ANALYSIS OF MARKET STRUCTURES

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THE scaffolding we need is one that will help us do the work of scientists—make tolerably accurate predictions. In the present context the predictions relate to the contracts made when items are exchanged; in particular, to those provisions and consequences of the contracts that influence the amount or distribution of the society's real income.

Predictions about the contracts of individual decision-makers emerge from the theory of the firm and the household. Such predictions presuppose the information summarized in the supply and demand functions confronting the individual, whereas it appears feasible and important to *produce* such information by taking a broader perspective. For this purpose it is convenient to focus attention on groups of contracts that are especially interdependent; hence the concept of a *market*.

A market is the environment in which a group of *close substitutes* is sold. Items are close substitutes if a plausible improvement in the terms on which any one is available would soon substantially detract from the saleability of the others.

Market Performance. What is to be predicted about a market? Ideally, all contracts that will occur therein and all their economic implications —that is, what each buyer will buy from each seller and at what price, transfer cost, profit, etc. This is the *outcome*.

Full detail, however, even if attainable, is unnecessary for purposes of appraising the impact of the contracts on society's income, or even on a participant's income. Thus, it is unnecessary with respect to a perfectly competitive outcome to specify the exact pairings of intramarginal buyers with intramarginal sellers. What is of primary concern are aggregate results—total quantity, overall success in trading of intramarginal versus extramarginal participants, etc. This is where the concept of *market performance* enters. Performance consists of the "interesting" attributes of the outcome.

The attributes that seem to interest most economists can, I think, for

[1] The author is indebted to B. C. French for helpful comments. This is Giannini Foundation Paper No. 215.

many markets helpfully be divided into two categories—multisession performance and session performance. The distinction is based on the concept of a *market session*, which corresponds to Marshall's market day. A session is an interval of time during which a given demand and supply interact to produce a set of contracts. A session ends when a change occurs in who is participating in the negotiations (except for departures of persons whose remaining offers are irrelevant), in the participants' demand and supply prices (except as these are altered by the trading itself), or in the trading environment. The short run and the long run are not homogeneous time spans but sequences of such sessions.

Multisession performance refers to attributes that are meaningful only with respect to a number of outcomes—intersession price flexibility and drift, turnover among buyers and sellers, profits, productive efficiency, product quality and variety, progressiveness, etc.

Session performance refers to quantity exchanged, average price, price dispersion, and direction and cumulation of price movement. More important are two attributes—*surplus* and *strength*—which derive from a concept of (marginal) *subjective values.*

The highest price at which a participant believes he would buy one unit of the commodity is the subjective value to him of acquiring one unit; the highest price at which he names two units is the subjective value of a second unit; etc. Similarly, the *lowest* price at which a participant believes he would *sell* one unit is the subjective value to him of releasing one unit; etc. Considering all persons actively interested, an array of the acquiring subjective values from highest to lowest, and an array of the releasing subjective values from lowest to highest (or a mathematical equivalent), constitute the least question-begging concept of (objective *ex ante*) market demand and supply.[2]

Surplus refers to the sum of the acquiring subjective values actually satisfied, minus total communication and transfer costs, minus the sum of the releasing subjective values actually satisfied. Surplus is a measure of trading efficiency. It is maximized when the perfectly competitive—that is, intramarginal—transactions occur.

Strength refers to the division of surplus between buyers and sellers,

[2] If participants are interested in more than one unit and if the rate of substitution of money for the commodity decreases as money decreases, an area under such a demand (or supply) curve is an upper limit for the amount of money that would be extracted (paid) under perfect discrimination. See K. E. Boulding, "The Concept of Economic Surplus," Ch. 32, of *Readings in the Theory of Income Distribution.* (Philadelphia, Pa.: 1949).

For purposes of predicting multisession performance, it should be noted that such a function is automatically a short-run function if—as in cobweb theory—some of its shift variables relate to lagged prices or other attributes of previous outcomes. (In a dynamic theory lagged values are not arbitrarily assumed to equal current values.)

provided they can be distinguished. Strength is a measure of how the gains from trade are divided. The division will be equal if average price falls midway between the figure associated with sale of the actual quantity under perfect discrimination against buyers and against sellers (but see note 2). This occurs with perfect competition, of course, only if demand and supply are equally steep.

Predictions of session and multisession performance can be either *specific* (with a dimension) or *relative* (with a pure number). For example, a specific prediction might state that the expected quantity is 100 boxes, whereas the corresponding relative prediction might state that the expected ratio of actual to perfectly-competitive quantity is 1.0 (or 1.2). Specific predictions will normally be desired by participants or others who are concerned with a particular market, while relative predictions will be desired by legislators and others who are concerned with issues common to many markets and need information that is comparable. To verify the relative predictions by direct evidence is more difficult, since *ex ante* as well as *ex post* data are needed, but it is possible (indeed usual) to defend them by *a priori* reasoning without reference even to *ex post* data.

Three procedures seem to be available for predicting session performance—*price analysis, probability modeling,* and *performance correlation.*

Price Analysis. Price analysis consists of obtaining demand and supply functions by analysis of time series. It has the great merit of yielding specific predictions of quantity and average price. It also has a great limitation, quite aside from statistical problems and the need to extrapolate.

A fitted demand function portrays the smoothed historic or *ex post* relation between quantity sold and average price that remains after allowing for the effect of changes in shift variables. The function will reproduce *ex ante* demand only if the average location of *ex post* quantity and price has been at the intersection of *ex ante* demand and supply (with indivisibilities, there is a *zone* of intersection). It is a great discredit to our profession that, with the notable exception of Chamberlin,[3] we have failed to recognize that empirical tests of this equality are critical for the underlying price theory. We have proceeded *a priori,* and with the unwarranted assumption that performance under uncertainty averages to the same values as under complete information or recontract.

Actually, when prices vary during a session, the stronger *a priori* argument is that the expected *ex post* location is, for many markets, in the region above and right of the intersection. Thus, the typical result at an ordinary auction with atomism seems likely to be that a few misinformed,

[3] Chamberlin, E. H., *Towards a More General Theory of Value.* (New York, 1957), Ch. 11.

anxious, or naive intramarginal buyers will bid up early prices long enough to shift up the price expectations of other intramarginal buyers, who then will keep prices above the intersection level (the highest extramarginal acquiring value) until the final round.

Suppose, on the other hand, that negotiations involve bargaining instead of bidding, as at exchanges. With atomism and no premature cessation of trading, no less than the intersection quantity could occur, because it is calculated by pairing seriatim the highest acquiring subjective values with the lowest releasing values until no acceptable pairings remain.[4] If the highest acquiring values were paired instead with the *highest* acceptable releasing values, then we would have the maximum quantity (and minimum surplus). Because both "high" and "low" prices will occur during a session, actual pairings, and actual quantity (and surplus) can be intermediate. Without recontract, apparently they usually will be intermediate.[5] This creates "bias" at an atomistic exchange even though, for average price, there is no apparent reason to doubt that *its* probability distribution is symmetric around the intersection. Compare Figure 1 (which relates to the data in notes 4, 7, 8).

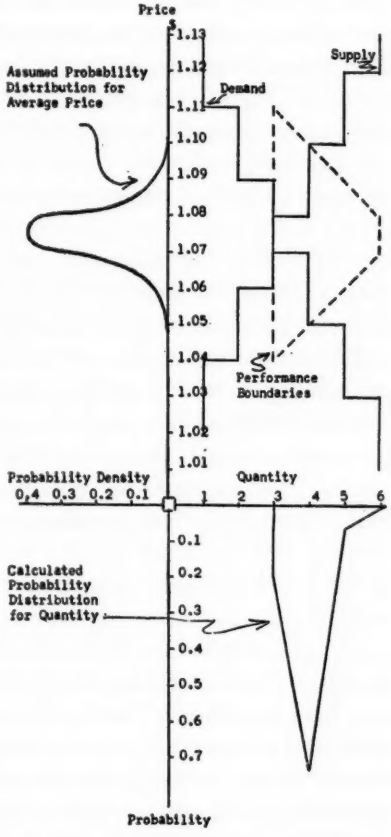

FIGURE 1. PRICE-QUANTITY PERFORMANCE AT AN ATOMISTIC EXCHANGE WITH PROPORTIONAL PAIRING PROBABILITIES

For either the auction or the exchange a fitted demand function would overstate the height of *ex ante* demand. This creates no problems if the historic discrepancy continues and we want to predict merely *ex post* price and quantity. But we obtain no basis for predicting surplus or

[4] Suppose that, net of transfer costs, demand consists of the subjective values $1.13, $1.11, $1.09, $1.07, $1.05, and $1.03, while supply consists of $1.02, $1.04, $1.06, $1.08, $1.10, and $1.12. The intersection quantity is three, obtained by pairing $1.13 × $1.02, $1.11 × $1.04, and $1.09 × $1.06.

[5] For evidence pertaining to a simulated market, see Chamberlin, *op. cit.*

strength or anything else that depends on knowing the *ex ante* functions.

Probability Modeling. A complete probability model would have four inputs. One is the subjective values of participants. The other three are generated by, and represent the implications of, participants' *market conduct*—their collusion, communication strategies, and pricing formulas. The second input is the conditional probability that applies to each *offer segment*. An offer segment, roughly, is all buyers and sellers who are present to compete for a particular transaction. At an ordinary auction, for example, each offer segment includes all buyers and one seller.[6] The third input is the conditional probability that applies to each pairing that might arise from a given offer segment. At an atomistic exchange, for example, the probability of each pairing might be proportional to the surplus it would create.[7] The fourth input is the conditional probability that applies to each price at which a particular pairing might occur.

Given the four inputs, we can derive a pair of magnificent outputs: the probability of each possible sequence of pairings of acquiring with releasing subjective values, and the probability of each possible sequence of prices—in a word, the probability of each possible outcome. In terms of session performance, we obtain the probability distribution of average price, etc., over their *a priori* ranges (with atomism and no premature closing, average price will be less than the average of intramarginal acquiring values and more than the average of intramarginal releasing values).

Ascertaining values of the four inputs for a real market may prove impossible. Understanding the approach, nevertheless, would have at least two benefits. One is that it allows us to calculate how small is the probability of the perfectly-competitive outcome when the second, third, and fourth inputs, which price theory bypasses, take values that might be expected under uncertainty.[8] The other benefit is clarification of what should be involved in the third approach.

Performance Correlation. The idea of performance correlation should be to find market attributes that correlate with the aforementioned offer, acceptance, and pricing probabilities, so that it is possible to make rela-

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[6] This is why the tendency, suggested above, for buyers to impose discrimination on themselves at ordinary auctions does not apply equally to the sellers.

[7] Assume the schedules in note 4. The surplus that \$1.13 × \$1.02 would create is \$0.11. The surplus from \$1.07 × \$1.06 is \$0.01. The sum of the possible surpluses is \$0.91. With proportionality, the probability that the first contract will be \$1.13 × \$1.02 is 11/91; that of \$1.07 × \$1.06 is 1/91; etc.

[8] For the situation in note 7 the probability that one of the 36 sequences of pairings will occur that would produce a set of perfectly-competitive transactions—that is, purchases by \$1.13, \$1.11, and \$1.09 and sales by \$1.02, \$1.04, and \$1.06—works out as 0.205.

tive predictions about performance if given the state of these attributes, and specific predictions if given also the subjective values.

Quite exact predictions apparently can be made for a market with these four attributes: no collusive communication, a homogeneous commodity, negligible interest of any participant in a second unit, and rules of trading that prescribe sale of all units simultaneously either by ordinary auction or by bilateral sealed bids with all prices to equal the highest rejected bid. In these circumstances offer segments are predetermined and a uniquely optimal pricing formula containing no reference to others' actions should be obvious to all participants. A perfectly competitive outcome results.[9]

Given other market attributes, however, complexity implies that the best we may be able to accomplish is predicting, not the actual central tendency and dispersion of session performance, but the direction, and perhaps amount, of changes therein that would follow from certain changes in a limited number of market attributes.

One category of these attributes is *market structure*—environmental constraints or opportunities to which participants must adapt, at least for the time being. Most of market structure—e.g., the use of money—is unvarying and may be taken for granted when we are concerned with a single economic system.

Of the remainder, perhaps the most intriguing—certainly as to causes and effects the most neglected (except by agricultural economists concerned with the trends toward off-terminal marketing)—is the *transaction system.* A transaction system is a particular combination of trading rules (laws, customs, bylaws). There is strong *a priori* reason to suspect that, in the absence of the complete information or recontract of conventional price theory, participants' optimal and actual strategies—and therefore the contracts made and transaction costs incurred—vary with the transaction system.[9] In particular, significant differences may arise according to what offer segments are prescribed, whether competing offers are exposed or concealed, whether bidding or bargaining occurs, and whether price is as agreed or according to a criterion such as the highest rejected bid.[10]

With *uncentralized* systems (those whose offer segments omit both some buyers and some sellers), the sending of offers and other communications, and the selection of recipients, is left to participants' discretion.

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[9] Compare Vickrey, W., "Counterspeculation, Auctions, and Competitive Sealed Tenders," *J. Finance,* March 1961, 16:24, 26.

[10] It appears that these four dimensions suffice to distinguish the various systems. Thus a Dutch auction has all buyers-one seller segmentation, *concealed* offers, bidding, and price as bid.

Choices, and therefore conduct and performance, are likely to be influenced by the level and uniformity of the costs entailed.[11] These constitute a second dimension of structure.

A third is the level and uniformity of various transfer costs—transportation, commissions, etc. With uncentralized systems, transportation *differentials* in particular may be associated with some very interesting conduct (such as basing-point price leadership) and performance (such as cross-hauling and milk-versus-cream zones).

A fourth is the cost to participants of revising decisions—especially prices and production. Precommitment may have a substantial influence on participants' pricing formulas and other strategies.[12]

How about the orthodox variables? The "number and the size distribution"[13] of buyers and sellers is indeed relevant. To serve as an explanatory variable, however, it should refer, not to the concentration of *ex post* transactions, but to the concentration of *ex ante* intramarginal subjective values. What is involved is not an objective environmental condition but a property of participants' states of mind and materiel. The same is true of heterogeneity—i.e., nonuniform evaluation of the nonprice terms of participants offers. In fact, at least six dimensions of *participant characteristics* appear important in explaining performance.

Third, *intraslopes,* the comparative steepness of demand and supply. Suppose prices tend to split the average available difference between pairs of intramarginal values. Then if demand averages steeper than supply, expected average price will exceed the intersection.[14]

Fourth, *extras,* the comparative abundance of buyers and sellers who have only extramarginal values. Since extramarginal sellers make above-intersection asks or refuse below-intersection bids, a comparative abundance of them may tend to shift up intramarginal buyers' price expectations and thereby elevate average price.[15]

Fifth, *insight,* the accuracy of participants' initial information about each other's values and strategies. If, for example, the average early estimate of the intersection price is an overestimate, average price may be elevated above the intersection.

Sixth, *foreboding,* participants' willingness to sacrifice current surplus

[11] Compare Balderston, F. E., and Hoggatt, A. C., *The Stimulation of Market Processes* (Univ. of California Management Science Research Group, 1960), Ch. 17.

[12] Mills, E. S., "Uncertainty and Price Theory," *Quarterly J. Econ.*, Feb. 1959, 73: 116-130.

[13] Bain, J. S., *Industrial Organization* (New York, 1959), p. 8.

[14] Chamberlin, *op cit.*, p. 233.

[15] Bain, J. S., *Barriers to New Competition* (Cambridge, 1956), pp. 190-201; Fuchs, V. R., "Integration, Concentration, and Profits in Manufacturing Industries, *Quarterly J. Economics,* May 1961, 75:278-291.

in order to reap either nonmonetary or future benefits—fewer competitors, less price chiseling, forestalled entry, lagged demand response, customer loyalty, etc. Even when participants are numerous, their conduct is likely to depend on whether immediate or sustained gains have priority.

Once such dimensions of market structure and participant characteristics are identified, the problem is to speculate about, and by market simulation or empirical study to test for, correlations between them and session performance. (Note that, excepting transaction system, each variable mentioned is quantitative.) For example, it may be possible to establish that the expected ratio of actual to perfectly competitive surplus increases, or increases by 10 percent, if we move from an exchange to an ordinary auction; or if we move with an uncentralized system from an average membership in offer segments of 10 percent of participants to 20 percent; or if we move from an average of two intramarginal subjective values per intramarginal participant to one. The publications cited indicate that it may not be long before we have a set of predictions applicable to markets with uncertainty.

Multisession Performance. Price analysis, probability modeling, and performance correlation can be adapted also to predict multisession performance. Apparently the principal additional explanatory consideration is the relation of entry, exit, expansion, and contraction to previous performance. Examples of predictions that have been derived are cobweb cycles when producers respond to price with a uniform lag; higher profits for industries whose concentration exceeds 75 percent by eight, and for highly concentrated industries if entry barriers are greater; and "the lion's share of a peacefully divided market" to a duopolist whose "opponent cannot obtain enough financial support to make a threatened fight unprofitable."[16]

[16] Shubik, M., *Strategy and Market Structure* (New York, 1959), p. 242.

DISCUSSION: A THEORETICAL SCAFFOLDING FOR ANALYSIS OF MARKET STRUCTURES

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The Sosnick paper provides us with an interesting examination of some of the techniques for analyzing market structures. In it we find a number of new terms (such as offer segments and intraslopes) which identify

known ideas, and we also find some familiar terms, such as foreboding and insight, which have specialized meanings peculiar to this paper. While some of the terminology introduced is helpful in portraying the ideas Sosnick has advanced, there are instances in which I find difficulty created by their interjection.

The concept of the market session, for example, in spite of the reassurance that it corresponds to Marshall's market day, appears to have some elaborations which may not be successfully subsumed under the usual lengths-of-run notions with their attendant fixity specifications. An illustration of my difficulty in making use of the market session as a unit of observation of the performance of a market is found in Sosnick's statement, ". . . naive intramarginal buyers will bid up early prices long enough to shift up the price expectations of other intramarginal buyers who will then keep prices above the intersection level . . . until the final round." While a shift in the price expectations of these intramarginal buyers would appear to me to end the market session by a change in the trading environment, in line with the definition provided, Sosnick interprets this as a shift in the participants' demand price in response to the trading—and the market session continues.

In providing us with a theoretical structure for analyzing market structures, Sosnick has given his major emphasis to the contributions of positive theory in accomplishing such analysis, although many of the most vexing problems of market structure have been normative problems—indeed some of the most celebrated anti-trust cases have dealt with the products of agriculture. There is an important need for guidelines from normative theory also to bolster this analysis. It is regrettable in view of Sosnick's past appraisal of the theory of "workable competition" that more attention was not given in this paper to this aspect of the scaffolding.[1] The scaffolding presented here seems, in its normative aspects, to be shored up mainly by the notion of perfect competition as a frame of reference, although in other writings Sosnick has observed that this norm has been rejected in favor of the development of criteria of workable competition.[2] With this latter view I am in complete agreement, difficult though the development of such criteria may be.

In what appears to me to be a detour enroute to the significant matters of the contributions of price analysis to studies of market structure, Sosnick has devoted substantial space to an endorsement of Chamberlin's earlier statement that performance of an imperfect market—a bargaining market—under conditions of uncertainty without recontract does not tend

[1] Sosnick, Stephen H., "A Critique of Concepts of Workable Competition," *Quarterly J. Econ.*, LXXII: 380-424, Aug. 1958.

[2] *Ibid.*, p. 383.

to produce the same value outcome as a market operating with complete information and recontract. After rereading Chamberlin's description of the market experiment with his students which Sosnick's example follows, I find several points which make it difficult for me to reject the usefulness of conventional price analysis as Sosnick has done. First, the example represents the encompassing of a series of individual demand schedules which are each perfectly inelastic. Each person will take no more than one unit regardless of how low the offering price may be, a doubtful reality indeed when one moves away from markets for items like today's newspaper. The bargaining model portrayed in the example is of limited usefulness, even if we waive the preceding limitation, because the majority of today's markets are those which involve trade at set prices as the most common mode of operation. Finally, in defense of the conventional methods of price analysis, we must consider that the output of conventional price analysis has been the prediction of *ex post* prices and quantities for the very valid reason that these are the only observable results. Few indeed are the requests for an analysis of the mental state of the participants in the markets, the state of their insights or forebodings, compared to those who wish to know the predictions of realized price and quantity in a particular market or markets.

Consonant with his views that *ex ante* aspects of demand and supply are the desiderata for predicting market performance, Sosnick has extended the search for quantification of anticipated actions by participants in the market with probability modeling. In discussing the contributions of this proposed mode of analysis, Sosnick has intermixed the subjective values held by the participants with the probabilistic aspects of market performance to derive a set of "magnificent outputs." This should, he says, tell us the probabilistic attributes of possible pairings and the probabilities of each possible sequence of prices. While I admire the imagination and insights into the market process which Sosnick has shown in concocting this model, I must agree with his view that determining the values of the inputs necessary to derive his magnificent outputs may—indeed will—prove impossible. In fact, I have serious doubts about the ability in practice of researchers to determine the subjective (*ex ante*) values held by participants which are needed to fuel his example in determining the probability of the perfectly competitive outcome under conditions of uncertainty (Sosnick's footnote 8). While the subjective values of participants are important determinants of their conduct in the market and hence market performance, I am not convinced that the data needed to convert these attributes into a probability model are at hand. And it follows that without the ability to obtain such data, much of the proposed probability model becomes academic.

In summary, Sosnick has given us a succinct and imaginative paper which stimulates thinking on the methods of analyzing market structures. The real test of its worth, however, like any other scaffold, will come in the answer to the question of whether or not it will contribute needed support in ideas for economic "workmen" in their analysis of the problems of market structure. I believe it will.

THE EFFECT OF MARKETING ORDERS ON MARKET STRUCTURES AND SOME CONSEQUENT MARKET DEVELOPMENTS

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MARKETING orders enable producers to alter certain aspects of market structure affecting the performance of their industries and the conduct of constituent firms. From the economist's point of view, they are an excellent area in which to study the impact of changes in market structure. Changes are *large* (effects are potent); *abrupt* (there exists a clear-cut before-and-after sequence); *rigorously defined* (in the order itself); and, in part, *documented* (an order generates data). Moreover, the impact of similar structural changes can be observed in orders covering different industry situations.

This paper is based on Federal marketing orders covering fruits and vegetables. Excluded are Federal milk orders and State marketing orders. By "market developments" I mean conduct of firms and performance of industries. "Market structure" includes ". . . those characteristics of the organization of a market which seem to influence strategically the nature of competition and pricing within the market."[1]

Causal Sequence: Structural Changes to Desired Conduct and Performance

In part, the effect of marketing orders represents the controlled outcome of a rationally selected, anticipated sequence of events. A carefully chosen alteration of market structure is intended to lead successfully to certain economic results, fulfilling the policy-objectives of the Agricultural Marketing Agreement Act. The controlled relationship between structural changes and desired conduct and performance is at the heart of marketing orders.

The Act clearly defines the causal sequence by which parity prices, the major policy-objective, is to be achieved:

> It is declared to be the policy of Congress . . . *to establish and maintain such orderly marketing conditions* for agricultural commodities in interstate commerce *as will establish . . . parity prices. . . .*[2]

Although parity prices, the desired dimension of industry performance, could be achieved through a variety of causal sequences, the Act specifi-

[1] Bain, J. S., *Industrial Organization* (New York: John Wiley and Sons, 1959), p. 7.
[2] *Compilation of Agr. Marketing Agreement Act of 1937. Reenacting, Amending, and Supplementing the Agr. Adjustment Act, as Amended. As of Jan. 1, 1958.* Agr. Handbook No. 124, Agr. Mktg. Serv., USDA, April 1958, p. 2.

cally requires it to emerge from a change to orderly marketing conditions. And "to establish and maintain orderly marketing conditions" is tantamount to establishing and maintaining a changed market structure.

"The best-laid schemes o' mice and men gang aft agley." In part, the effects of orders on structure, conduct, and performance fall into the realm of side-effects—ancillary to the orders' objectives, sometimes unanticipated, perhaps undesirable, usually unavoidable. One commentator has likened a marketing order to a harness, perhaps put on a horse to get him to pull more efficiently. But lo and behold, he's not only more efficient, but he starts pulling in a direction all his own. And, after a few years' pull, he metamorphoses and is not quite the same horse you started out with. These side-effects may emerge as repercussions on structure, for example affecting the number and size of handlers. In the realm of conduct and performance, the raisin industry responded to volume regulation with a flourishing practice of producer sale (and handler purchase) of equities in pooled tonnage. Producers sold in part for convenience motives, handlers purchased in part for more effective procurement policy. An important speculative element was introduced affecting the income distribution performance of the industry.

Effect on Structure: Promulgation Stage of an Order

The Act is *enabling* legislation. Producers must want an order and initiate action to utilize the legislation. Even this initial response creates fundamental changes in market structure. Suppose an industry consisting of many small producers experiences heavy supplies, declines in demand, and disastrous prices. A "working committee" of producers might enlist support for a proposed marketing order to regulate supplies marketed. A successful working committee generates two initial changes in market structure: (1) Mutual recognition of interdependence among many small, competing sellers is created or enhanced. Producers increasingly recognize the fact and (sometimes disastrous) consequences of the extremely small, "imperceptible," impact of their individual supply offerings on the prices received by every other producer. (2) Group action (via an order) is taken to deal with the new structural situation of mutually recognized interdependence.

Other structural changes in the promulgation stage of an order involve handlers and Government. Handlers now face a new "rival," the organized producer group whose actions they must take into account, and against whose proposals they may put their case in the hearing procedures. On certain proposed elements of the order, some handlers sharing an interest position may aline themselves against other handlers with a divergent interest position. The government's role in the developing structure includes: (1) *Assistance and guidance* to all parties, thereby in-

creasing the degree of knowledge underlying the proposals and their counter-arguments; (2) *Conducting public hearings;* (3) *Decision-making* –approval or disapproval of the proposal in light of the Act, the evidence submitted, and any further information available.

Effect on Structure: Operating Stage of an Order

An order is substantially an industry agreement with full compliance enforced. This is the basic structural change. All industry agreements, within or without the framework of law, contain similar elements: (1) *Actions agreed upon.* Under an order, the following activities are permitted: Regulation of quality and quantity shipped; reserve pools; surplus control; container regulation; research projects; prohibition of unfair trade practices; and price posting. (2) *Parties to the agreement.* Although only handlers are regulated by an order, both producers and handlers participate jointly in the marketing agreement program on which the order is based. (3) *Procedures.* Two major elements include: An industry committee to operate the order (for example, the committee decides upon and recommends the particular *degree* of volume regulation); and government approval of all industry committee recommendations. (4) *Enforcement.* Provided under an order by the Federal Government.

What is involved in the basic structural change to a marketing agreement program with full compliance? Let us examine some direct, immediate[3] changes in market structure resulting from an operating market order.

1. At the heart of an order is the establishment of a distinctly separate "regulated" market structure. The pre-existing "unregulated" market structure *minus certain elements subjected to regulation* operates side-by-side with the regulated structure.

The regulated structure consists of components which may be analyzed profitably with concepts ordinarily applied to market structure. Regulatory activity is determined in the regulated structure in part as a result of bargaining and negotiating among committee members, e.g., shall volume restriction be at the 50 or 60 percent level? Committee members, usually producers and handlers, may act as individuals in the bargaining process, or may form rivalrous coalitions based on mutually shared interest positions. Government is also an extremely important member of the regulated structure. All committee decisions concerning the degree and character of regulatory activity are in the form of *recommendations* to the Secretary of Agriculture. Only if the Secretary decides that a recommendation effectuates the policy of the Act, will it be approved and made binding on the industry. A large area of freedom is allowed indus-

[3] Changes in structure which are *repercussions* of an order are discussed in the following section in connection with consequent market developments.

try committees in submitting recommendations. This permits an aggressive, well-informed, and ably led committee to achieve developments and performance in regulatory activity far more competent, and sometimes more far-reaching, than a comparatively weak committee.

Operationally, conduct and performance emerge from the regulated structure as follows: Usually, the regulatory decisions determined within the regulated structure are fed back into the unregulated structure as restraints on the conduct of handlers. (The "point of administration" of an order is not at the producer level, but at the handler "bottleneck" in the marketing channel.) Desired results in terms of conduct or performance then emerge in the unregulated structure directly (e.g., prohibition of an unfair trade practice); or indirectly (e.g., quantities purchased by handlers for resale are limited and *consequently* prices to producers are increased). However, in some cases the regulatory decisions determined in the regulated structure may be carried out by conduct of the committee in the unregulated structure (instead of via restraints on handler conduct). For example, in the raisin order the committee operates as the sole seller of pooled tonnage to handlers, setting prices and quantities of successive offers.

2. Another significant structural change is that the membership of the industry committee (stipulated in each order) typically places producers in a numerically dominant position. However, the Act limits the *degree* of dominance exerted by producers in the regulated structure. For example, the Act specifies that consumers and the public interest must be protected; and that no action may be taken maintaining prices in excess of parity. In addition, competition of substitute products, threat of entry, and opposition within the committee may dampen price-raising and other regulatory activities of the numerically dominant producers.

3. In another structural dimension, the degree of knowledge within the industry is increased by orders (especially those with volume regulation). This is accomplished primarily by the collection and dissemination of economic data necessary to operate the order. Producers typically gain advantage from more information and understanding concerning handlers' operations. Orders usually improve communication processes within an industry, especially between groups with conflicting interests. The degree of organization necessary for an order enables the industry to crystallize and to effectively support its interest-positions on a wide range of problems.

4. Under an order, a producer industry increases its recognition and its degree of reaction to the relationships existing: (a) "Vertically" between itself, the channel of marketing firms, and the consumer; and (b) "Horizontally" between itself and competing production areas or commodities. For example, an industry may become more aware of the

impact of retailers' policies on the sales of their commodity. Thus, it may tailor quality regulations to increase sales via their impact on retailers' sales policies.

5. Product differentiation may be affected directly by grade, size, or quality regulations.

6. An order may create structural conditions enabling the operation of a discriminatory pricing system. Market independence may be enforced to prevent supplies from leaking back into the price-enhanced market.

7. The position of already strong producers' cooperatives may be enhanced under an order. To be successfully instituted, an order usually must have the support of the cooperative. In its dual role as handler and as a representative of its producers, the cooperative gains additional flexibility in negotiating on the industry committee. Also, in contrast to competing handlers, it experiences indirectly (via its producers) some of the gains achieved for producers by the order.

Some Consequent Market Developments

Now that we have considered changes in market structure resulting from a marketing order, let us examine some developments consequent to these changes. A recurrent theme in all orders is the differential, or selective, impact of regulations on industry firms. This can significantly affect the income distribution dimension of performance. (For example, the incidence of quality regulation falls more heavily on producers of poor quality commodities.) Regulations necessarily produce differential impacts where the firms involved are not identical entities in identical situations. Consequently, it is difficult to establish an order in industries where production is widely scattered, or to develop areas of agreement between orders in competing production areas.

Grade, size, and quality regulations in a market structure directly affect the conduct of firms. For example: 1. Handlers are not permitted to receive or ship (hence no producer or reseller may sell) units of a commodity below certain specifications. 2. Firms specializing in below-specification commodities must adjust their operations. 3. Producers may adjust to different varieties. 4. Changed volumes of operation and income distribution may be involved, and some marginal firms may exit. 5. Methods of harvesting, and hence costs, may change. 6. Quality regulation (always accompanied by inspection) may better adapt the industry to the practices of large buyers with needs for better quality, uniform merchandise. 7. Industry practices of price-cutting based on offerings of poorer quality are eliminated. It is possible that this may have a strengthening impact on prices.

From the consumer standpoint, low-income groups may lose under

grade, size, and quality regulations through disappearance of "bargain-quality" commodities. However, improved product quality may be better adapted to preferences of most consumers. It is possible that the demand for the improved commodity may increase, relative to substitutes. Grade, size, and quality regulations may be used to reduce supplies significantly. With no close substitutes and an inelastic demand, prices and total income may be increased.

Marketing orders with strong volume regulation in the market structure (such as surplus control with diversion to an alternative outlet) usually have the greatest impact on conduct and performance. Major issues commonly associated with such marketing orders concern their impact on: Price-raising; production response; stability; and distributive margins. Benedict and Stine[4] have suggested some broad generalizations concerning the impact of marketing order programs. Among these are the following: Modest price-gains are possible to producers but stimulation of production prevents continued, unwarrantedly high, price-levels; possibility of monopoly gains are greater for nonperishable than perishable commodities; no significant effect in narrowing distributive margins has occurred; individual commodity studies are needed.

Let us consider as a specific case, some developments consequent to volume regulation under the Federal raisin order.[5]

An effective two-price system was established with limitation of quantities sold in the domestic (free) market, and diversion to the export outlet.

Producer bargaining power has been enhanced as handlers have had to purchase more aggressively in the face of continuously restricted free market supplies. For example, with free market supplies limited to 50 percent of the crop (i.e., 50 percent of each producer's delivery), a handler meeting normal sales commitments for 1,000 tons would have to consummate purchases with producers accounting for 2,000 tons. (The other 1,000 tons delivered would be set aside in a pool for subsequent sale by the industry committee). In addition, substantial reduction in handlers' inventory levels as a result of volume restriction also has increased producer bargaining power.

The industry's performance in terms of seasonal stability has been greatly improved. A remarkable degree of seasonal (weekly) price stability has resulted from volume regulation. The typical, highly erratic, seasonal price pattern existing prior to the order (and in above-parity years when

[4] Benedict, Murray R., and Stine, Oscar C., *The Agricultural Commodity Programs. Two Decades of Experience*, (New York: The Twentieth Century Fund, 1956), pp. 407-413.

[5] These findings, in greater detail, will soon be published by the Econ. Res. Serv., USDA.

volume regulation has been suspended) has been superseded by a stable, usually gently rising, level of prices throughout the October-May marketing season. As a result, much of the intensely speculative trading activity characteristic of the industry prior to the order, and based on erratic price changes, has disappeared.

The quantity of free (domestic) market supplies released by the committee was based in part on estimated levels of free market demand. This implies a tendency to contract marketings (though not necessarily production) and maintain prices in the face of cyclical declines in the economy. Performance-wise, this departure from traditional agricultural behavior is significant.

Pooling operations have transferred some of the crop's financing costs from handlers to producer-owners of equities in pooled tonnage. In the practice (referred to earlier) of trading in pool equities, producer-sellers consistently lost and handler-purchasers gained in years when substantial uncertainty existed concerning the future value of pool returns. Primarily smaller producers participated in such trading.

Volume regulation placed no unique market pressure on the acquisition policy of the major raisin marketing cooperative. Cooperative members simply delivered their supplies (of which, say, only 50 percent were earmarked "free"). By contrast, independent handlers, competing with the cooperative, had to purchase their equally limited supplies in a competitive market featured by sharply curtailed supplies and enhanced producer bargaining power.

Although causation cannot rigorously be demonstrated, it is most likely that average prices to producers for all raisins received a unique upward impact from the order. One line of evidence is provided during the period of the order by a substantial price increase in raisins relative to prices paid for raisin grapes by the winery outlet. The wineries compete vigorously with the raisin industry for raisin grape supplies, and the cost of physically transferring supplies between outlets is negligible. The other line of evidence would develop *a priori* from the impact of an effective two-price system on a commodity whose domestic demand is apparently highly inelastic. Domestically, raisins have no close substitutes, and about half of the crop is used as an ingredient by commercial firms (bakeries, etc.). Because the United States is only one of several major exporting countries, it is likely that the export demand for U.S. raisins is more elastic than the domestic demand.

Raisin production, despite the price increase relative to the competing outlet, was reduced somewhat. Although other factors were also involved in the production decline, substantial support can be adduced for the hypothesis that pooling a large percentage of the crop made the raisin

outlet less attractive relative to the winery alternative. Pooling not only deferred producer returns, but also increased their uncertainty, and required producers to yield control over sale of pooled tonnage to the industry committee. (By contrast, a hop marketing order which attempted to restrict volume and enhance prices by the price control technique of limiting the volume each producer could sell, stimulated production and dissipated gains).

Unit margins to raisin handlers increased somewhat more than prices to producers. There is no apparent basis to support the case that handlers' margins suffered as a result of price increases or increased bargaining power to producers under the order. It is likely that the impact of price-raising was passed along to consumers.

During the period of the order, net exits of both producers and handlers had repercussions on the structure of the industry and income distribution. The industry became one of fewer firms, with greater concentration of output among larger firms. Exits were concentrated among smaller producers and handlers. Exit of capacity reinforced the upward impact of volume regulation on producer prices and offset the potential negative impact of declining industry production on handler profits. Remaining handlers experienced increased volumes handled as well as increased unit margins. Did the order affect exits? Certainly other factors also are involved. The meager existing economic evidence indicates that exits of small producers (to sell in the winery alternative) may be traced in part to the impact of uncertainty and deferred returns associated with the pooling technique. Small handlers tended to deal selectively with small producers. Consequently, the exit of smaller producers would have a greater impact on small handlers.

An order may facilitate adaptation by the industry to certain economic and marketing problems or to changed economic conditions. Such adaptation might be impossible, or sluggish and incomplete, under the market structure existing prior to the order.[6] On the one hand, grade, size, and quality regulations usually constitute progressive adaptations. However, gains from volume regulation may produce a lulling effect on an industry, substituting for other needed adjustments. This is not a necessary effect, though. Under the raisin order improved methods of estimating and reporting the size of raisin crop were developed; a crop insurance program was initiated; and the systematic exploration and development of a new market, the Japanese, was undertaken.

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[6] For example, Shepherd argues that marketing agreements have a place in the economic system precisely because the markets for many farm products are not perfectly competitive. Shepherd, Geoffrey S., *Agr. Price Policy* (Ames: The Iowa State College Press, 1947), p. 147.

Conclusions

Marketing orders possess unique significance in the development of agricultural policy because they provide producers the opportunity to alter certain aspects of the market structure in which they sell. As a result, the actual, and especially the potential, impacts of orders are complex. They go far beyond the implications and significance of any simplified monopoly-gains or discriminatory-pricing models. Where orders are feasible, the opportunity provided by the legislation is flexible upwards. The Marketing Agreement Act can accommodate itself to almost any degree of producer ingenuity, resourcefulness, and progressiveness. However, the temptation to short-sighted, retrogressive solutions exists under marketing orders, as it does in most areas of human endeavor. The challenge is primarily to producers. However, a definite challenge in research is also created for agricultural economists to explore the full impact and potential of this marketing device.

DISCUSSION: THE EFFECT OF MARKETING ORDERS ON MARKET STRUCTURES AND SOME CONSEQUENT MARKET DEVELOPMENTS

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Mr. Townshend-Zellner's paper deals with a subject that is both timely and significant. Increasing attention is being given to emerging market structure problems in agriculture.[2] Marketing orders are being used more widely, and further applications are in prospect.

It is appropriate that we give increasing attention to interrelations between marketing orders and market structures. Mr. Townshend-Zellner identifies and discusses the key features of marketing orders, and he ably points out the kinds of changes they give rise to. His empirical evaluation of the Federal raisin order is a useful kind of analysis, not only to the raisin industry, but also to persons interested in analyzing or anticipating the effects of marketing orders on other industries.

In considering a framework for the evaluation of marketing orders, I wish to comment briefly on his use of the term "market structure." My objective in doing this is not to criticize the main content of the paper, but

[1] Appreciation is hereby expressed to Emerson Babb, Robert Freeman, and R. L. Kohls for helpful comments.

[2] A 1960 survey by the NCR-20 Subcommittee on Market Structure, conducted by Milton Manuel of Kans. State Univ., indicated that 41 Agr. Expt. Stas. had currently active research projects dealing with various aspects of market structure.

to propose a slightly altered framework for considering his analysis. I would suggest that the term "market structure" be confined to a somewhat more restricted use. My concern is not with terminology as such, but to bring out an aspect of marketing order evaluation which I think should especially be emphasized.

Mr. Townshend-Zellner refers to Bain for his general definition of market structure, but in the paper he appears to include in structure those aspects of market conduct which are directly affected by a marketing order. He states that "An order is substantially an industry agreement with full compliance enforced. This is the basic structural change." This discussant suggests, however, that when a marketing order is applied, basic structural characteristics are bypassed and some of the main immediate effects are on market conduct; that is, changed firm and industry operating practices.

The characteristics identified by Bain as strategic aspects of market structure are (1) number and size distribution of buyers and sellers, (2) the degree of product differentiation and (3) the conditions of entry to the market.[3] Structure does not include anything external to the market, but relates primarily to factors commonly found in every market that are significant internal features of the market setting and that affect the conduct of firms.[4]

A marketing order changes the legal and economic framework within which the industry operates so that an external force, Government, is brought to bear on conduct. Specific alterations of conduct may be in the form of restraints, such as price, quantity, and quality specification, with control enforced, or the lifting of restraints, such as permission to engage in certain activities through their being exempted from coverage by antitrust laws.

Volume or quality regulation becomes possible under an order, for example, not because the actual number or size of sellers has been changed, but because the traditional conduct of these sellers can be effectively different from what the structure in the pre-order legal and economic framework was able to generate. The changes in conduct, hopefully, lead to desirable changes in performance.

In the longer run, changes in conduct and performance may produce changes in structure. Mr. Townshend-Zellner recognizes the longer run effects of an order on structure. In his discussion of the raisin order, for example, he noted that exits of smaller producers and handlers affected

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[3] Bain, J. S., *Industrial Organization* (New York: John Wiley and Sons, Inc., 1959), p. 7.

[4] This is essentially the position taken by the NCR-20 Subcommittee on Market Structure in preparing a statement entitled "Market Structure Analysis as an Orientation for Res. in Agr. Econ.," *J. Farm. Econ.*, Aug. 1961.

the number and size of firms and their consequent income distribution. Handlers remaining in the raisin industry had increased volume and gained higher unit margins.

The metamorphosis in market structure, mentioned in the paper as a side-effect ancillary to an order's immediate objectives, may well be the more important matter to take into account. Will an order, for example, hasten structural changes which would have occurred more slowly if conduct had not been affected by the order, or will the change in structure be in one of a variety of new directions? Will certain groups or certain kinds of firms under an order receive such favorable treatment that they will become exceptionally strong, will develop vested interests in a new *status quo* under the order, and will then block further changes which could lead to continued improvements in industry performance?

Increased information can initiate or accelerate a change in structure. As Mr. Townshend-Zellner points out, the level of knowledge begins to increase with preliminary discussions of an order. And if the order is applied, continuing series of supply and price data are generated and widely available. Conduct is changed as functioning decision-making centers for industry groups are identified. Areas of conflict are defined more precisely. Procedures for resolving conflicts are established, and negotiation of differences to the mutual benefit of parties to the conflict are potentially more likely.

Structure may be changed in that increased market knowledge may affect some firms differently than others. The market positions of some firms may have been sustained partly by imperfect market knowledge and by product differentiation. Increases in the availability of relevant market knowledge, its distribution among buyers and sellers, its adequacy in terms of sharpening price-quality comparisons and of reducing risk or uncertainty about the future, may change the economic position of one firm or group of firms relative to another.

The topic of the paper might also be turned around. That is, what is the influence of market structure on the provisions of an order, or on whether an order will be applied in the first place?

Marketing orders are in large part a response to the needs of purely competitive market structures. It is not possible for the conduct of firms in structures approaching pure competition to be effectively changed from within. The marketing order device produces certain conduct changes in pure competition which can be obtained in some other market structure without the force of Government.

If an order is applied, its specific provisions undoubtedly are influenced by the kind of market structure which exists among handlers, the firms with which producers deal, as well as by attributes peculiar to the commodity or area. Such differences might determine, for example, whether

primary emphasis under the order should be given to supply control, grading and standardization, or marketing and selling devices.[5]

A marketing order is a social invention with proven advantages for certain commodities and market situations. Its full potentialities are not known. More analyses of the kind discussed here are needed. The opportunities for improving market performance are enhanced by having available, for consideration as one alternative, the marketing order device.

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[5] For a general discussion of various types of activities which may be advantageous under an order, or through group organization, see Kohls, R. L., et al., *Group Bargaining for Farmers*, Purdue Univ. Agr. Ext. Serv., Mimeo EC-214, 1961.

EMPIRICAL MEASUREMENT IN MARKET STRUCTURE RESEARCH

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EMPIRICAL research in the field of industrial organization is not new to agricultural economists. The pioneering works of Hoffman and Nicholls are included in any bibliography of significant studies in this area. But until recently, market structure research was almost completely neglected for over a decade. Many things contributed to this neglect. Among them were: the coming of World War II which changed the nature of problems considered relevant by researchers; the initial emphasis on operational efficiency in research sponsored by the Marketing Act of 1946; the barriers to obtaining empirical data; the greater attractiveness of new and sophisticated theoretical tools more applicable in other areas; and the inherent controversial character of much of the research in industrial organization. Combined, these factors led to the virtual abandonment of significant empirical studies in this area by agricultural economists for over a decade.

But things have changed, almost over night. Much of the renewed interest has been virtually thrust upon the profession. The most prominent marketing problems of the 1950's, as viewed by many farmers, their cooperatives, food processors, distributors, and public officials were matters of market power and bargaining, price discrimination and predatory practices, vertical integration and contract farming. These problems generally did not lend themselves to analysis by the tools most familiar to marketing economists, especially those techniques appropriate for demand analysis, plant operational efficiency, and, more recently, operations research. Not surprisingly, therefore, many economists turned to market structure theory to learn what it had to offer.

I fear that for many this new interest will turn out to be just another fad. Therefore, I want to express my convictions as to why research in this area is of paramount importance today.

Public policy in a free enterprise economy is concerned with insuring that industries perform in a socially desirable manner. This end may be achieved through either indirect or direct intervention into the affairs of business.

The indirect approach attempts to maintain, encourage, or create an industrial environment in which firms, and those responsible for business

[1] These comments are the author's and not necessarily those of the Federal Trade Commission.

decisions, perform in the public interest. The other alternative is to replace the indirect approach with direct Governmental regulation of industrial performance. This would require specification of performance norms and the business behavior necessary to achieve them.

I shall not argue the merits of these alternative approaches. At this point in our history it is clear that, with notable exceptions, the indirect approach is preferred to the direct, both because it is most consistent with our political institutions and because available economic evidence and regulatory experience suggest that it offers a realistic and workable means of achieving desired industrial performance. This has been the unifying principle of our antitrust laws since 1890.

The indirect approach to business "regulation" places a heavy responsibility upon economists. To be workable, the indirect approach to regulation requires reliable knowledge of the interrelationships between industrial environment and performance. And, unhappily, economists have failed to specify adequately the sorts of industrial environment needed to achieve desirable performance. This is why empirical inquiry is so badly needed.

Market structure theories are pregnant with theoretical predications of the relationship between market structure, conduct, and performance.[2] And some significant relationships between these variables have been verified empirically. But much more reliable knowledge is needed if we are to have sound public policy through indirect public regulation.

This raises two questions. Who is to pursue this inquiry and which tools are best suited for undertaking it? As to the first question, I have no doubts that academic economists should expand their efforts here. The need is sufficiently great that such expansion should occur even if it means curtailment of or interference with other areas of research. (I mention the latter because the controversial character of such research has caused concern in some quarters that it might interfere with the effectiveness of the researchers' efforts on other problems.)

I am convinced that the marginal returns to society of *competent* market structure research are greater then *competent* research in most other fields of marketing. If academic economists never made another plant efficiency, industry demand, or other type of study, provided freely to marketing firms, most of these things would still be done, albeit at private expense. But if academic economists do not engage in objective and penetrating studies into the anatomy and behavior of our industrial organization, no objective inquiry will be made into many of these matters.

Before turning to the question of the "how" of such studies, I must

[2] I am using these terms as defined by Bain, J. S., *Industrial Organization*, John Wiley & Sons, 1959.

add a somewhat pessimistic note concerning the probable outcome of the recent proliferation of market structure studies by agricultural economists. I fear that too many of these have been poorly conceived, are relying on inadequate data, and will make little overall contribution to our general store of scientific knowledge. Moreover, because this is an inherently controversial area of inquiry, I fear that for many researchers, their first entry will be their last. And anyone who thinks he can research in this area for long and avoid controversy completely is either deluding himself, coming up with completely sterile results, or is not being entirely forthright in his inquiry. An honest analysis of the structure and performance of any important industry probably never will satisfy completely every interested party, and perhaps none. This is the great hazard of research in this area, and I will watch with interest the mortality rate of market structure research projects in our land grant colleges.

Methodology in Industrial Organization Research

There seems to be much confusion over appropriate research methodology in this area, and the most adverse critics of this approach even deny that any methodology exists. This confusion arises largely because of two mistaken beliefs: First, that problems susceptible to a market structure approach are separated entirely from other problems and, second, that market structure analysis requires unique empirical methods. Both of these beliefs are largely incorrect.

The market structure approach is essentially an orientation in research. Its chief function is to provide hypotheses useful in understanding and forecasting the probable conduct of firms and the performance of industries. The case for drawing upon market structure theories to explain industrial behavior is justified because it provides hypotheses not suggested by other approaches. The test of whether to use market structure analysis as an orientation in particular research inquiries is one of relevance. Market structure hypotheses should be tested in competition with other hypotheses. They become irrelevant when they do not prove useful in explanation or prediction.

Empirical research involving a market structure approach may be divided into three broad categories:[3] (1) measurement of the various structural variables which economic theory suggests are relevant to performance, (2) empirical determination of the economic and other bases of these variables, (3) specification and measurement of the interrelationships between market structure, firm conduct, and industrial performance. I shall not recite the numerous significant problems falling into

[3] This classification draws on the recent paper by Clodius, Robert L., and Mueller, Willard F., "Market Structure Analysis as an Orientation for Res. in Agr. Econ.," *J. Farm Econ.*, Aug. 1961, pp. 515-33.

these various categories because this recently has been done elsewhere.[4]

The methodology most useful for analyzing these different types of inquiry varies. Time does not permit extensive discussion of the various types of research methodology appropriate for the myriad problems in these various categories. I shall direct my remaining comments to reviewing the empirical procedures used and results obtained in one study of the way in which market structure may determine or influence firm conduct. The phenomenon which this inquiry attempted to explain was why retail grocery chains have integrated to varying degrees into various grocery manufacturing industries.

An Example: Vertical Integration by Grocery Retailers

Economic theory suggests many reasons why grocery retailers might wish to enter food manufacturing. The hypothesis selected in a study by Garoian and Mueller was that grocery-retailer integration into manufacturing is explained largely by the market structure of industries supplying grocery retailers and by certain barriers to entering grocery manufacturing.[5]

Specifically, grocery retailers have the greatest incentive to enter those food manufacturing industries in which firms have the greatest amount of market power in selling. The relatively high profits of such industries act as a strong motive for entry by retailers.

In our analysis we assumed that there is a perfect correlation between market concentration and market power, and consequently, profit rates. There obviously are a number of objections to these assumptions. First, market concentration is only one structural variable affecting market performance. However, it does *reflect* the other main variables—product differentiation and ease of entry. If, as seems probable to us, one of the main sources of high market concentration in food manufacturing is successful product differentiation, then high concentration reflects successful product differentiation, and the latter in turn constitutes the main barrier to entry. Hence, we assumed that concentration ratios reflect the *relative* market power of sellers in various grocery-manufacturing industries and that consequently, other things being equal, grocery retailers will enter to a larger extent industries with high concentration than those with low concentration.

The most important problem is to develop a procedure to keep "other things equal." The use of multiple regression analysis would seem to be indicated. However, quantitative data on these variables were not immediately available. We hypothesized that the main barriers to chain entry into manufacturing were economies of manufacturing plant, suc-

[4] *Ibid.*

[5] The following discussion is based on Mueller, Willard F., and Garoian, Leon, *The Changing Market Structure of Grocery Retailing*, Univ. of Wis. Press, 1961, pp. 68-104.

TABLE 1. RELATIVE EXTENT OF INTEGRATION BY TOP 20 CHAINS AND CONCENTRATION RATIOS OF FOOD MANUFACTURERS IN 16 INDUSTRIES, 1957

Industry	Index of relative extent of vertical integration by top 20[1]	1954 concentration ratios of grocery manufacturer		
		4 largest firms	8 largest firms	20 largest firms
Poultry dressing	10	17	23	33
Cheese	17	23	28	35
Ice Cream	20	33	41	52
Butter	20	14	19	28
Fruit and vegetable	22	28	38	50
Jams and jellies	33	26	36	53
Margarine	33	39	64	93
Meat Packing	35	39	48	56
Peanut Butter	38	54	65	79
Evaporated milk	42	79	86	97
Salad dressing	50	60	70	81
Biscuits and crackers	60	66	73	81
Gelatin desserts	75	80	89	95
Coffee roasting	75	54	68	82
Baking	95	80	90	100
Cereal preparation	100	78	89	98

[1] This index was computed by dividing the number of the top 20 chains which had actually integrated into these industries by the number of potential integrators as discussed in the text. Source: Mueller and Garoian, *op. cit.*, p. 85.

cessful product differentiation by existing firms, unique technical or management know-how, and strategic patents. We, therefore, contrived a measure which would reflect the *relative* heights of the barriers confronting chains wishing to enter various industries. Because we did not have a direct measure of the importance of the various factors affecting these barriers, we used the following method to obtain estimates of the relative heights of these barriers in various manufacturing industries studied.

Our method expressed the heights of the barriers to entry in terms of the size which a grocery chain must be to hurdle barriers to entering manufacturing. To arrive at an estimate of the minimum size necessary for a chain to enter a given industry, we used the actual size (at the time of entry) of the smallest chain which actually had entered the industry.[6] Using these minimum-size figures, we then calculated the number of the top 20 chains which were potentially large enough by 1957 to have entered the 16 food industries studied. We then computed a relative integration index for each of these industries. This index is the ratio of actual integrators to potential integrators (Table 1). For example, by 1957 all of the 20 largest chains were large enough to have entered the fields of poultry dressing and baking. However, only two reportedly were still

[6] The analysis was restricted to the experience of the 20 largest chains because these were the chains on which we had the most complete data.

engaged in poultry dressing, whereas 19 were engaged in baking; thus, the integration index numbers of these two industries were 10 and 95, respectively, indicating the greater *relative* integration into the manufacture of baked goods.

When this index is correlated with the 1954 concentration ratios of the four largest manufacturing firms in their corresponding industries, the correlation coefficient is .85.[7] Thus, about 72 percent of the variance in the degree of chain integration into these industries is associated with differences in the degree of market concentration in manufacturing.

Personally, I think these findings are quite significant. They not only are helpful in explaining why chains enter food manufacturing, but they represent the first successful empirical verification in any industry of the relationship between vertical integration and market structure. Of course, they leave much to be desired because they do not provide us with a direct measure of the actual parameters of the process. Because our index of the barriers to entry lumped all barriers together, we know nothing of the importance of each. Moreover, this restricts the analysis only to industries which chains actually entered.

To untangle these problems a different approach has been developed recently.[8] This approach first made estimates of the economies of scale in plant in various food manufacturing industries and the degree of product differentiation in these industries. Again, concentration ratios were used to measure the relative market power of firms in grocery manufacturing industries. The first two variables were measures of the barriers to chain integration into food manufacturing and the third variable measured the market structure incentive for integration.

These variables were incorporated into a multiple regression model which did an excellent job of explaining the actual number of chains entering 33 grocery manufacturing industries. Nearly 83 percent of the variance was explained by the dependent variables and the corresponding sign of each parameter was consistent with the theoretical justification for its inclusion. Again, the market concentration variable was found to be the most important in explaining the extent of integration into grocery manufacturing.

The lesson I have tried to teach with this example in this. Market structure theory offers hypotheses useful in explaining significant relationships in industrial organization. Second, the procedures used to test

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[7] Correlation with the concentration of the 8 largest firms results in an r. of .85, and for the 20 largest, .80. All of these correlation coefficients are statistically significant at the 1 percent level. The regression equation is $y = -4.41 + 1.02X$; X is the concentration ratio of the top four grocery manufacturing firms.

[8] The following reference is to a study conducted by Parker, Russell, a USDA Cooperative Agent located at the Univ. of Wis., who worked under my direction until recently.

empirically these hypotheses are unique only in their application. Third, the most important problems in such analysis are obtaining reliable data and organizing them in a fashion which will lend itself to quantitative measurement.

A final word of caution. Not all important problems in this area lend themselves to precise measurement. If we restrict ourselves only to those which do, we will certainly ignore many of the most important ones. Or, worse still, if we include only those variables in a particular problem which lend themselves to precise quantitative measurement, we may neglect the most significant variables. The oft-repeated dictum, "it is better to be vaguely right than precisely wrong," has a special application in the field of market structure research.

Finally, I certainly do not want to leave the impression that only market structure theories provide significant hypotheses explaining industrial performance. Certainly organization and game theory also may provide useful hypotheses. But I do think that at this time market structure research is more promising than either of these other areas. The theoretical apparatus of organization theory is not as well developed nor as susceptible to empirical testing as market structure theory. And the data problems for testing organization and game theory are even more formidable than for market structure theory; secondary sources are almost useless in these other approaches. Moreover, these approaches, especially game theory, seem to be more oriented toward, and most useful in, solving the problems individual firms confront in maximizing profits. I doubt whether anyone would propose seriously that public funds be expended to help oligopolists make maximum use of their market power.

DISCUSSION: EMPIRICAL MEASUREMENT IN MARKET STRUCTURE RESEARCH

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University of West Virginia

Mueller has done an excellent job of pointing out the need for market structure research. I agree with him that much of the marketing research work in such areas as plant efficiency and industry demand studies would be performed by private marketing firms and that, "objective and penetrating studies into the anatomy and behavior of our industrial organization," would go largely undone if not handled by academic economists. However, I would like to point out that the findings from studies dealing with demand and plant scale may be quite useful in relating structure to performance.

It would seem logical to assume that marginal returns to society would

be relatively high for research work of market structure. Mueller has correctly pointed out the high probability for controversies to develop over the findings of any forthright study in this area. Consequently, there is a need for strong support on the part of administrators for this type research. This will require considerable courage on their part due to the controversies likely to develop and also due to the fact that the best the researcher may be able to do is be, "vaguely right."

We have in Mueller's paper a good example of an empirical measurement of the relationship between concentrations and vertical integration. However, it seems that our real interest and that of society is not concentration, as such, but performance. The real question is to what extent has concentration modified or brought about demonstrable changes in market performance in terms of prices, quantities, income distribution, and the like. While I agree with Mueller that concentration, which may reflect product differentiation and ease of entry, is the principle variable affecting performance, there are others which may be quite important.

For example, we found in a study that the fact that one firm in a market was a cooperative proved to be the dominant factor in determining performance and overshadowed the fact there were only a few firms in the market.

The following quotation from Nicholls is a word of caution in this area:[1]

> All market situations must be approached on their own merits. Preconceived notions of . . . oligopoly situations are just as likely to throw one off the track as to yield light. We are in the realm of things where individual decision plays an enormously important role. The capricious . . . and irrational or mistaken judgment of one member of a market may be far more important than all the theoretical generalizations there are. Who would deny that price policies would not have been different in an automobile industry without its Ford or a tire industry without its Firestone?
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> We must, therefore, realize that our analysis of oligopoly-oligopsony has of necessity proceeded on a very abstract plane. It has presented a series of models which should be very helpful in empirical work. But this is true only if we are careful to avoid the common failing of empirical studies in economics whereby the existing theoretical analysis of an assumed set of circumstances is simply applied to a more complex set of facts and offered as a complete explanation of the outcome.

Bridging the gap between structure and performance is the difficult phase of research in this area. This requires familiarity on the part of the research worker and data on the market under study which are often difficult to obtain. In conclusion, I would like to congratulate Mueller for his contribution to our knowledge in the area of market structure.

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[1] Nicholls, W. H., *A Theoretical Analysis of Imperfect Competition with Special Application to the Agricultural Industries,* Iowa State College Press, Ames, 1941, p. 151-152.

AGRICULTURAL GRADING IN THE 1960'S

CHAIRMAN: V. JAMES RHODES, UNIVERSITY OF MISSOURI

THE FUNCTION OF GRADES IN AN AFFLUENT, STANDARDIZED-QUALITY ECONOMY[1]

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ONLY IN an "affluent economy" are there many technical alternatives of production with substitutable inputs and many subdemands within broad classes of end-goods.[3] Its producers, handlers, exporters, and consumers can rationally pay different prices for different grades of related goods or services. In a "nonaffluent" economy, there are few and simple manifested want patterns, markets, materials, or opportunities for discrimination among grades in production or marketing of broadly defined products. In the "affluent" economy, many inputs and some end-goods are produced and sorted or sold to recognized specifications. In a sense, they are of "standardized quality." In some poor nations and in other managed economies, many consumer goods are of this type. Yet, again, in affluent and uncontrolled economies, both input and end-products in general have many different but related substitutes. While many inputs are specification items with little seller differentiation, variation by sellers of end-goods in materials, design, package, location, services, terms, and other attributes of end-goods is a major instrument of actual competition.

Words

"Grades" are subdivisions of product classes defined by attributes, magnitudes, and ranges or tolerances. For the questions at issue here, grades and "quality" are taken to be synonymous. Few if any items—other than coupons or certificates for service—are identical. Costs of containing heterogeneity in the production of some items may often be prohibitive when weighed against associated enhancement of returns. There are stringent administrative limits to indefinite proliferation of grades. Thus, operationally, a grade is a simplification like the lumping of data into the classes of a frequency distribution or like the classification of life forms. There are almost unlimited possibilities with respect to choice of the

[1] Giannini Foundation Paper No. 214.

[2] Director, Giannini Foundation of Agr. Econ., Univ. of Calif.

[3] There is no simple definition of "affluence." Similarly, the number of "alternatives" constituting "many" is surely no absolute. Perhaps poor economies should use more and more complex grades. Generally, they do not perhaps because of poverty itself. There is little grading of perishables for local sale in some rich nations. "Subdemand" coefficients are regarded as uniform within but varying between subsets of a commodity class.

attributes and magnitudes defining individual grades and therefore the battery of grades covering the entire commodity. The criteria governing optimal specification of grades are thus far not settled for many of the functions toward which grades seem to be directed.

Many definitions of grades and quality—some nonoperational and others unrelated to optimal generation or exploitation of alternative production techniques or demands—are used. For example, it has been held that: "grade" is higher if price or cost is higher, if ratings by experts are higher, if sales at given prices are greater, or if "preferences" are higher.[4] Under some conditions, controlled production or the sorting of produced supplies can yield higher net return to sellers than would bulked sale of the same volume at a single price. Yet, even where subdemands (or productivities) for grades of a commodity are known, independent and static, the attributes defining grade categories must actually reflect different productivities or commercial subdemands. Where these functions are not known, or are independent or unrelated over time to the grade specifications, the net effect upon returns of alternative patterns of grade classifications and allocation of sale or use among them cannot so easily be estimated.

Questions

The "functions" of grades in the "affluent" economy can be expressed through a series of hypotheses—some theorems consistent within broad theoretical systems, some tested or at least testable, and others neither.

1. Grades are obviously essential to collection of meaningful market news as guides for arbitrage among alternative outlets on an equal f.o.b. price basis.

2. Under specified conditions, price-differentiated marketing among grades can enhance short-run and perhaps long-run returns to sellers.

3. The channeling of items into grades is essential to the matching of quality, including terms of sale, to diverse individual preference systems, and price-differentiated marketing based upon grades may yield higher "aggregate consumer satisfaction" than would the unsegregated sale of all of the items in the commodity class at a single price.

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[4] Two examples, among many, may be cited: Theil, H., "Qualities, Prices and Budget-Enquiries," *Review of Economic Studies*, Vol. XIX(3), No. 50, 1952-53, pp. 129-148. p. 129—"Let us define a quality as a perfectly homogeneous good, at least as a good the heterogeneity of which may be neglected. Let us define a commodity as a set of qualities. . . ." Also, Houthakker, H. S. and Prais, S. J., "Quality Variations in Family Budgets," *Econometrica*, Vol. XX, No. 2, April 1952, pp. 309-311. (Also published in full form under the title "Les variations de qualité dans les budgets de famille." *Economie Appliquée*, Vol. V, No. 1, Jan.-Mar. 1952, pp. 65-78.) ". . . define quality by prices paid, which is reasonable if prices are constant between consumers." Here, grades are defined for the purposes of this paper as categories of a commodity class separated from each other by different definitional variables, magnitudes or tolerances. The commodity class can be defined in terms of production or demand substitutability relationships or both, for convenience or for any other reason.

4. Classification into grades can increase physical efficiency—at least under some conditions—and especially where grades for production of raw materials are systematically integrated with production requirements of processor-customers and their distributor-customers.

5. Similarly, grades can decrease procurement costs by elimination of purchase on an inspection basis.

6. Brand-grades may provide insulation against adjustments in price, grade, promotion, or other terms by competitors.[5]

7. As a closely related function, brand-grades may provide latitude for price variation as an instrument of competition by decreasing the size of the market and increasing the ratio of the seller's sales to total sales.

8. Brand-grades may shift preference structures and lift demands.
   a. Products differentiation may be a necessary condition for promotion.
   b. Minimum grades—like those in some standardization laws—may protect individual class demands from adverse effects of sales in related classes.
   c. Grade requirements for inputs—like those in some laws limiting varieties, sprays, odors, or pests—many protect against adverse effects of inputs used by others.
   d. In oligopolistic markets, product differentiation may be an alternative to price competition.
   e. Variation over time in grade specifications and batteries of grades may facilitate manipulation of preference and demand structures.

9. Introduction of new products may be facilitated by variation over time in grades.

These hypotheses imply that grades may enhance the efficiency and lower the costs of production and procurement operations; increase net returns from a given supply through arbitrage or through price-differentiated marketing; and extend competitive devices beyond price competition alone by providing bases for product differentiation, supply manipulation, promotion, or new product development. If net subdemands are given, independent among themselves with respect to realized prices and static—optimal grade distributions and allocation among markets can be determined at least conceptually.Where they are known, interdependent, and invariant in level but not in form over time—optimal grade specifications conceivably can be determined but optimal allocation among outlets is far more difficult to specify.[6] Where the demand functions are sequentially related in form or level to realized or expected price in submarkets—but are independent of the grade specifications themselves—

[5] "Brand-grades" mean those classes of a commodity specified by a seller as one instrument of his merchandising policy.

[6] It is *assumed* here that if demands for classes are known, it is still necessary to decide how grades shall be defined and how products shall be allocated among them.

there appears to be no definitive theory limiting tenable hypotheses for allocation of given grades among markets or even for definition of the grades themselves. Where realized or expected sales in given grade categories may lead to changes in preference structures or to production responses, there again seems to be no useful theory. Consequently, many of the hypotheses set out above are not presently susceptible of even informal test against measurement, trade experience, or simple judgment.

The Hypotheses and the Evidence

Market news and arbitrage

Price quotations not tied to grades and pack specifications may not be helpful as guides to allocation in marketing without price differentiation. This is a reason, among others, for limited geographic distribution in "nonaffluent" places. Yet, even in advanced countries, profitable segregation into grades may require several other basic conditions: high purchasing power associated with a complex set of wants; advanced technology in domestic or export outlets; no extreme limits to containment of heterogeneity in raw materials; high productivity of labor as a limit to individual inspection; and the existence of collateral marketing facilities essential to distant sale. As evidence, nearby sales of U.S. farm perishables are often ungraded and there is little standardization of grades and packs for domestic sale elsewhere. The reasons for the absence of grading for local sales of perishables in advanced countries are not clear.

Price-differentiated marketing

With known, static, and independent subdemands, criteria for optimum allocation are well known.[7] Yet, the functions are not always or perhaps even usually known. Conceivably, commodity demands could be striated by many different grade combinations. The criteria governing optimal specification of grades are not known even for the short run. Long experience with market controls indicates that short-run gains can be obtained through grade-based, price-differentiated marketing. However, nearly always, shifts in level, even if not in form, of demands and production responses over time have severely limited the long-run gains. There is neither theory nor experience whereby the long-run optimal grades or allocations can be specified.

Increased "aggregate consumer satisfaction"

It is assumed, and probably correctly in most cases, that processors,

[7] The pioneer study of Waugh, Frederick V., Burtis, Edgar L., and Wolf, A. F., "The Controlled Distribution of a Crop Among Independent Markets," *Quarterly J. Econ.*, Vol. 51, No. 1, 1936, pp. 1-41, is an excellent expression of the maximization conditions. See, also, Waugh, *Quality as a Determinant of Vegetable Prices*, (New York: Columbia Univ. Press, 1929), pp. 69, 87-88.

dealers, and consumers can distinguish among grade classifications and relate them consistently with their own preferences, buying power, and alternatives. Presumably, specification of grades extends the range of choice and might therefore be expected, *per se*, to facilitate more accurate maximization in expenditure unless countered by monopoloid distribution.[8] There are major gaps in the logic from which this hypothesis is derived and no compelling empirical demonstration of its general validity seems available. Very poor countries probably cannot afford complex grade systems, and economies under central management seem nearly always to limit the range of alternative grades.

Lower operating costs

Physical efficiency of production, processing, and handling can be enhanced through grade classifications, perhaps even where market demands cannot be segmented. If merchandising policies of distributers are based, among other variables, upon uniformity and stability of supplies in many outlets, the necessity for consistent grades among raw products and processed items is clear. Further, the engineering requirements of large-scale distributors make grades an essential phase of their operations.

Lower procurement costs

There is ample logic and empirical evidence to support this hypothesis. Again, grades would not and generally could not lead to lower procurement expense except in "affluent" economies in which grade differentiation is possible at the consumer level. Further, separation of engineering and procurement economies attributable to grading is purely formal. The operations of specialized food processors and distributors would be impossible without grades as bases for both these sets of economies. Yet, for these purposes, grades would be generally useless in economics where such enterprises are not present.

Merchandising policies

Competition here is taken to include any operations relevant to enter-

[8] An interesting conclusion is set out by Lawrence Abbott in *Quality and Competition, An Essay in Economic Theory*, (New York: Columbia Univ. Press, 1955), p. 182.

> One moral of this tale, which has been made familiar to us by Adam Smith, is obvious: Large markets are needed in order to reap the full advantage of the economies of specialization and mass production. Another moral is less obvious, but perhaps equally important for us of the twentieth century: The proliferation of wants and activities in our complex society, the cultivation of enhanced powers of discrimination, the desire to satisfy wants with a high degree of precision, and technological advances in the exploitation of possibilities for specialization and mass production have combined to bring our civilization to the point where it can no longer expect to reap the full advantages of mass production techniques except by the dubious to expedient of curtailing people's wants and activities.

prise profit accounts. Accordingly, several phases of merchandising competition have been indicated as dependent upon development of grades. First, there is no doubt that one of the several purposes of developing and branding grades by a firm is to protect against changes by competitors in price, promotion, or the battery of attributes defined here as grades. Furthermore, at least in the short run, it may be possible to add price manipulation as a profit-affecting instrument if the size of the sales market for the item at issue can be decreased by differentiated brands actually representing different grades to purchasers. These are classical functions of grades and brands in merchandising. There is adequate theory under the restrictions noted above, and trade experience and some tests seem to support the hypotheses.

Yet, systematic variation over time in the battery of attributes called quality is obviously a major competitive device of distributors, most processors, and of some farm producers. Once all of the attributes of a product and the terms on which it is delivered can easily be duplicated by others, it becomes a "cordwood" item—undifferentiated, unprotected from competitor's adjustments, unsusceptible of promotion, and sold only on a going-price basis. Processors do not own the sales facilities of distributors as a general rule. The profit interests of distributors and those of processors are not invariably consistent. Accordingly, both processors and distributors are, in fact, constrained continuously to develop new products—hopefully differentiated. The changes in the U.S. food industry over recent years seem to support this view. However, there has been a counterdevelopment—equally dependent on grades. In the meat industry, for example, small-scale specialized processors have obtained uniform livestock and processed it to one or a few grades for the specialized use of distributors. Yet, these same distributors, dependent on uniformly graded carcasses from producers and processors, have then differentiated U.S. graded products by adding grade specifications unique to themselves.

There are a few statements of theoretical criteria for optimum change in quality or grades specifications.[9] Yet, most such statements are fatally afflicted by failure to refer to several operating facts of actual markets: short-run subdemands are often not known, static or independent; they are sequentially interrelated in that alternative allocations among them in one or several periods may engender changes in form and level of both demands and outputs of the controlled commodity and others related to it in production, demand or both; conceivably, grade and brand specifications and combinations may themselves alter preferences, demands, and perhaps production techniques over time; and, perhaps most

[9] As one example, see Benson, Purnell H., "A Model for the Analysis of Consumer Preference and an Exploratory Test," *J. Applied Psychology*, Vol. 39, Oct. 1955, pp. 375-381.

important, demands themselves may be functions over time of the introduction of new grades, brands, qualities—in short, of new product development.

It does not seem generally to be true that processors and distributors develop new products in response to already existing constellations of wants, buying power, and relative prices. The wants seem often to be created after the product is introduced. Product variation is essential to effective competition even with unchanging wants. However, preferences do seem to change over time. New product entry appears to be tentative, exploratory, and subject to continuous revision. This is an area of merchandising in which there has been little analytical speculation and virtually no formal development of theory or measurement.[10] As yet, there do not seem to be persuasive demonstrations of the determinants of qualties or grades actually produced; the effects of grade variation over time upon price, cost, output or market structure; and, perhaps most important, upon preference constellations. In short, grades are essential elements in the affluent economy; yet, when considered carefully, relatively little seems to be known about their genesis or effects or the criteria governing optimum specifications, grade combinations, or variation over time.

Summary

If grades are taken to mean the attributes whereby inputs and endgoods may be segregated into subclasses with consequent enhancement of efficiency returns and satisfaction, it is only in an affluent economy that grading is feasible or profitable. Grades are a means for rational distribution among alternative outlets, with or without price differentiation. They are necessary means for decrease of costs or enhancement of returns by enterprises not restricted to the single and homogeneous commodity postulated in older price theory. They are a major instrument in the competitive policies actually used in the American food industries. There is a body of theory dating back some three decades from which useful hypotheses with respect to optimal short-run allocation of given supplies among known subdemands can be drawn. Yet, there are clear relationships of grades—or quality or product variation or new product development—to market structure; to coordination of farm production with food processing and distribution; to changing preferences over time; and to prevailing methods of actual competition among enterprises. These questions seem to be the crucially important ones from both enterprise and public viewpoints. They do not yet seem to be answered nor is there yet adequate theory upon which answers to many of them might be based.

[10] One of the best studies, free of the restrictive assumptions of the early writings on monopolistic competition, is Abbott, *op. cit.*, 229 pp.

DISCUSSION: THE FUNCTION OF GRADES IN AN AFFLUENT, STANDARDIZED-QUALITY ECONOMY

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Prof. Mehren has said a great deal in a very short space. I shan't try to summarize his remarks—indeed, to my mind, they are more in need of expansion than of summary. Some of his statements I found quite cryptic. His general drift, however, is clearly expressed in his concluding statement: "Grades are essential elements in the affluent economy; yet, when considered carefully, relatively little seems to be known about their genesis or effects or the criteria governing optimum specifications, grade combinations, or variations over time."

In other words, we can't get along without them, but we don't really understand much about them. Grades thus take their place along with the ladies, God bless 'em, and some other essentials of the good life.

I would not disagree with much of what Prof. Mehren has said. Study of his paper, however, has stimulated me to a few random comments. First, his observation that grades are little used, and not very useful, in the non-affluent economy reflects one of the ironies of human culture or of its economic condition: namely, that the poor, who have greatest need to economize, have least opportunity to do so. Studying how to get richer is a luxury largely reserved to the rich. This perhaps has some implications for technical aid to underdeveloped countries.

Second, Prof. Mehren emphasizes that we have the theoretical basis for "optimal grade distributions and allocation among markets" only under highly restrictive assumptions that are seldom fulfilled in practice. In other words, we don't really know the best way to define grades or to allocate supplies among grade categories so as to maximize returns to producers or benefits to consumers.

Theory of grades, of course, is not unique among economic problems in this respect. A common complaint of all economics is our lack of general theory adequate to take account of the multiple complexities of real situations—especially the dynamic aspects. Even for something as much studied as budgeting or programming in farm management, it is my impression based on manuscripts submitted to the *Journal of Farm Economics* that our theory still limits our ability to take account of the complexity of farmers' objectives, their varying managerial abilities, short-run price uncertainties, or the longer-run implications of technological change. Our theoretical competence is even more limited, I judge, when it comes to running a supermarket. And as regards planning the economic development of an underdeveloped area, the main point of agree-

ment regarding theory seems to be that we can't agree on one.

Yet these shortcomings of theory do not and should not lead us to throw up our hands in despair. Economists *do* advise farmers and supermarkets and underdeveloped countries, and I suspect that much of our advice is beneficial. In this connection I was struck by a comment of George Tolley's yesterday morning, to the effect that we have perhaps been trapped in our own preoccupation with precise "equating at the margins," with the result that we have missed some of the more important problems. At the risk of joining George in traitorhood to the profession, I would remark that sometimes when we can't see the top of the optimization mountain we can nevertheless judge which way is up from where we are. This may be a dangerous metaphor, since we may sometimes turn out to be climbing the wrong hill. Even so, in much of human life the best is unattainable, but that need not dishearten us. Better is not best, but at least it is better.

So with grades. We may not know how to draw up the ideal system of grades. But we do have grades, and they seem to work after a fashion. Even Prof. Mehren agrees that they are useful—indeed, he uses the word "essential"—for some purposes. And I judge that over the years we have managed to improve them—albeit keeping them abreast of technological change is a problem.

This leads me to comment on the concept of "quality" in the first place. Prof. Mehren uses grades and "quality" as synonymous, and throughout his paper there appears to be implicit the assumption that quality is ordinal—higher and lower. Yet Webster's first definition of "quality" makes it synonymous with "characteristic." Quality meaning "superior quality" is a derived or secondary meaning.

Quality, then, need not be ordinal—good, better, best. It may be only different. Are baking potatoes "better" than boilers? Or chippers better than either? It all depends on what you want to use them for. Commercial grades were developed originally for use in trade, not in procurement for end use. The seller or the merchant buying for resale wants ordinal grades. The trader is not directly concerned with what a product is good for, his concern is with how much it will sell for. But there is also an important economic role for quality *identification*—for differentiating lots, or sorting into lots, on the basis of what the product is to be used for—bakers, boilers, or chippers.

Prof. Mehren omits or glosses over this ambivalence in the meaning of "quality." Yet I suspect that quality identification, even more than ordinal grading, is the basis for much of the contribution to physical operating efficiency in processing and handling that he finds to be one of the few clearly demonstrated benefits of grades. And it is a benefit that increases in importance with progress in technology.

New uses for products, new methods of processing, place more and more varied and specific requirements upon the quality characteristics of the products. To borrow an example from outside of agriculture, a model T I once owned could in a pinch be run on kerosene. This is not true of present-day Fords. In fact, modern internal combustion engines do not burn just gasoline. For optimum performance—or even to perform at all—they require gasolines of specified octane ratings. Similarly with agricultural raw materials—processors quite commonly buy not by U.S. grade merely, but by specifications that may start with a U.S. grade but that add a variety of supplementary quality requirements.

Whether the characteristics used for quality identification can serve also as a basis for ordinal grades (in terms of market value) depends upon whether there is a consistent preference for one set of characteristics over another, so that buyers will regularly pay more for one quality than for another, and whether there is a corresponding difference in production costs, so that users consistently will have to pay more to have their preferences fulfilled. (Our Chairman has discussed this briefly in a recent *Journal* article.[1]) This, as Prof. Mehren points out, is a matter susceptible to change as production technology changes or as user preferences change.

The last point leads to another that Prof. Mehren emphasizes—that the definitions that are established for quality (now in the ordinal sense) may themselves influence user preferences or production responses or both. And as he further observes, quality designations in the form of brands are used as instruments of deliberate merchandising policies aimed at changing preferences—leading us into a theoretical morass. It is, indeed, only a part of the broader morass in which traditional theory is ensnared by our affluent society. For traditional theory assumes consumer wants as the ultimate arbiter of allocation of productive resources. In our present society, however, we are devoting an increasing share of our productive resources to creating and molding consumer wants. Our exogenous determinants of the theoretical system become endogenous variables within it. Or in simpler language, our theory is cut away from its moorings.

In this connection, another recent article in the *Journal*, by Paul Farris,[2] offers at least a start towards a descriptive theory of the relationship between grades in the conventional sense and branding, product innovation, and product differentiation. It offers no mathematical formulae for optimization, but to my mind it offers helpful clarification of a difficult area.

In summary, then, Prof. Mehren has done us a service in pointing out

[1] Rhodes, V. James, "Acceptance and Yield of Choice and Good Beef: Research Results and Implications," *J. Farm Econ.*, 43:181-96, May 1961, p. 192.

[2] Farris, Paul L., "Uniform Grades and Standards, Product Differentiation and Product Development," *J. Farm Econ.*, 42:854-63, Nov. 1960.

how limited is our economic theory of grades and grading. I have made three main comments:

(1) In many other fields of economics besides grades our theory is sadly inadequate, but this does not wholly prevent us from useful contribution to practical problems. Even if we cannot optimize our situation, we can sometimes ameliorate it.

(2) Proliferation of processing methods and end uses is characteristic of the technically advanced economy, and with this goes increasing complexity of product quality specifications. Differentiation of products not just as higher or lower grade, but as differently suited to the varied uses that might be made of them becomes increasingly important in the technologically affluent society.

(3) A further characteristic of affluence—the devotion of resources to modifying the basis for resource allocation—raises a problem of circular reasoning that seems to me to pervade our traditional theory. Its implication regarding grades and quality standards in the affluent society is only one of the many ramifications of this problem.

ECONOMIC EFFECTS OF RECENT CHANGES IN LAMB STANDARDS

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GRADING and standardization become increasingly important as advances in specialization and commercialization continue in our food industry. The firms in the emerging market structure demand large volumes of standardized commodities that must be exchanged quickly, cheaply, and with confidence between buyer and seller. Uniform grade standards have facilitated the development of the mass production and mass merchandising food industry of the 60's. The changing structure of food processing and retailing has in turn increased the demand for grading and standardization. Yet, even in light of the general advantages of grading, the U.S. standards for lamb and mutton came very close to being eliminated a year and a half ago.

Early in 1959, a number of organizations in the sheep industry asked the Department of Agriculture to suspend Federal grading on the ground that it was hurting, rather than helping the marketing of lamb and mutton. Much controversy over discontinuance or revision of the Federal grade standards followed throughout 1959. This culminated in public hearings before the House Committee on Agriculture in January 1960. At the conclusion of the hearings, the Committee recommended that Federal grading of lamb and mutton continue without interruption, but under revised standards which would increase the percentage of lamb qualifying for the Prime and Choice grades.

Opposition to Federal grading stems from conflicting interest within the lamb industry. Grading of any commodity is justified whenever it is sufficiently heterogeneous that dividing it into more homogeneous lots will better serve the needs of the users. The entire industry would agree that some sorting or grading is necessary; the conflict revolves around who should do the grading and what qualities should be put in what grades.

Packers have different interests in grading, depending on their market position. Independent packers generally favor Federal grading because it improves their competitive position. However, they want a high proportion of lamb to fall into the Prime and Choice grades, as most of the

[1] This paper is based on a study conducted by USDA at the request of the House Committee on Agriculture. The author was on leave from the Univ. of Minn. to direct this project. Suggestions from Gerald Engelman, Raymond Gaarder, Stephen Hiemstra, Robert Laubis, and William Motes—the author's colleagues in the Econ. Res. Serv., USDA—are gratefully acknowledged.

wholesale price differential exists between the Choice and Good grade. Lowering the grade boundary on U.S. Choice reduces the risk that lambs may not make U.S. Choice or better when graded.

The national packers who have brand names generally oppose Federal grades, per se. U. S. Choice and U. S. Prime are more than quality designations which facilitate wholesale trading and price making; they are national brand names used in retail merchandising. All packers using Federal grades gain equal access to the market in terms of product acceptability to retailers. Therefore, Federal grades have improved the competitive position of the independent packers. National packers have policies of Federal grading only when it is demanded by certain customers. In contrast, many independent packers grade all that will make U. S. Prime and Choice.

Certain groups of lamb producers also opposed Federal grading, partly because of adverse economic conditions in the industry. Lamb prices in the past 2 years have fallen to disastrously low levels, causing many producers to leave the industry. Consumer demand for lamb is declining, the market is narrow and highly concentrated, and the marketing margin has widened substantially in the past several years. It was in this context that Western lamb producers, encouraged by some of the national packers, sought the elimination of Federal lamb grading during 1959. Federal grading became the scapegoat. However, natural conflicts of interest within the sheep industry had caused dissatisfaction with the grade standards prior to 1959.

Most of the Western sheep and lambs are of the larger, wool type which under the old standards required extended feeding to get into the Choice grade. Heavier and fatter lambs resulted and were discounted in price because of weight. Lowering the fat requirements for Choice would also increase the proportion of Western lambs that could be sold off grass for slaughter. The western oriented National Wool Growers Association and the National Lamb Feeders Association have historically advocated a decrease in the emphasis given to age and internal fat in the grading standards.

However, the native State lamb producers did not advocate changes in the grade standards. They produce lambs primarily for meat; lambs which are lighter and younger when marketed. These lambs develop more internal feathering without excessive outside fat, and age is not a problem. Higher proportions of native lambs made Prime and Choice under the old standards and they usually brought higher prices than fed western lambs.

The difference in type of lambs produced in different areas presents problems in grading. One of the basic objectives of grading is to separate out quality differences to aid the market in transmitting these differences

back to producers through price. Price equity among growers cannot be achieved without dissatisfaction from those who produce lower quality.

No organized group of retailers, wholesalers, institutional buyers, or consumers opposed Federal grading during the hearings. In fact, most stressed its importance in their operations. However, some wanted the standards changed, recognizing that while consumers want tender and flavorful lamb, they also object to excessive fat.

Use of Federal Graded Lamb

The impact and use of grading varies widely in different areas of the United States. Federal grading is a voluntary service performed primarily at the packer level and paid for by packers. The competitive position of packers relative to each other and the nature and structure of the market in which they sell are primary determinants of grading policy followed.

Two major consuming markets for lamb in the United States account for nearly three-fourths of total consumption. They differ substantially in organization and marketing practices. The east coast market is the largest and includes the concentrated area of population from Washington, D.C. to Boston. This area consumes about 50 percent of all U. S. lamb. The west coast is the other major consuming area, with nearly 21 percent consumed in California. Most of the lamb consumed on the west coast is slaughtered there. Lamb slaughtered in the rest of the country moves mainly to the east coast. Eighty-two percent of the lamb slaughtered on the west coast is Federal graded compared to 27 percent in the rest of the country.

New York City and other large cities on the east coast are old established areas of concentrated population. Food distribution channels and retail outlets tend to resemble the pattern of 20 years ago. Retail outlets are smaller and more numerous. Independent wholesalers still serve a substantial part of the retail market.

In newer areas such as Los Angeles, food distribution is more direct from processor to retailer and retail stores are larger and fewer. California has more than doubled its population in the past two decades compared with a 20 percent increase in New York. This has provided a favorable climate for the growth of supermarkets, and many small chains have also developed and prospered. The rapid growth of the retail chains in California demanded standardized products in ever-increasing quantities. Trained meat managers were scarce, but the need to maintain uniform quality grew as the various retail chains continued to add new stores. Federal graded beef and lamb filled this need. But in addition to the value of grades in procurement, graded meat became a label of quality that was promoted and advertised to consumers. They became widely accepted, and are now demanded. The competitive pressure to handle U. S.

Choice is such that only few retailers feel they can do otherwise. Also important is the fact that the major retail chain in California has always had a policy of handling Federal graded beef and lamb. This has prompted the growing local and regional chains to adopt similar policies and advertising practices in order to increase their market shares.

The demand for Federal graded lamb by retailers in California has not been resisted as in other areas of the country. Independent packers slaughter two-thirds of the lamb in California. Most have established policies of Federal grading to meet retailer demand and to counteract the brand names of the national packers. Most are specialized lamb slaughter plants with no established brand names of their own. Even though these independents sell locally, they feel that Federal grades give them the alternative of selling outside the west coast if any large packer attempts to increase its market share by depressing the local price. Bargaining position relative to the chains is also considered improved because of increased selling alternatives made possible by the broader market that exists for U. S. Choice.

The east coast market presents an entirely different situation. Here, the national packers are dominant with 70 percent of the supply and only 27 percent of the lamb U. S. graded. Private brands are actively promoted while Federal graded lamb is supplied only when demanded, often at a higher price. The supply of U. S. Choice lamb is largely determined by packers and not by the grade consist of the lamb population. Accordingly, some larger chains do not use Federal grades because of the uncertain supply and sometimes higher price. The major retail food chain and other leading retailers on the east coast do not have policies of handling Federal graded lamb. Consequently, little competitive pressure exists for smaller chains and other retailers to "follow the leader." Also, a greater proportion of the lamb is sold by smaller retailers who often are less knowledgeable about quality and prices. They tend to accept the quality and price of lamb they are offered.

Lamb comes into the East from the entire United States and covers a wide range of quality. Some variability in Federal grading can be expected; the packers may tend to have the fatter and wastier lamb U. S. graded; and the preference for lighter weight lamb in the East often was not met under the old grade standards. By the time some fed lambs got the internal fat requirements for U. S. Choice and they were too heavy.

Another highly significant factor which reduces the demand for Federal grading is the importance of the Kosher market. With only one exception, all the major packers in the East Kosher kill all lambs that will qualify. Most of the lamb leaves the cooler before it is firm enough to be U. S. graded. The Kosher market takes the foresaddle leaving the hindsaddle, including the loin and legs, which are relatively easy to sell

without any brand identification. Independent eastern packers sell over three-fourths of their lamb unbranded.

Wholesalers in all markets tend to merchandise Federal grades. It gives them a label of acceptance which widens their market. Much of their business is done with the hotel and restaurant trade which demands Federal grades.

It is in the above market context that the immediate and projected effects of the change in grade standards must be interpreted.

Immediate Effects of the Change in Standards

When the grade standards for lamb were revised on March 1, 1960, the minimum requirements for the Prime and Choice grades were reduced. This increased the potential supply of Prime by including approximately the top half of the old Choice grade. The boundary for the new Choice grade was similarly lowered by including about the top third of the former Good grade. The reduction in standards was greatest for the more mature or fed lambs, and in general less emphasis was placed on fat and more given to firmness and conformation. U. S. Good became a narrower grade because its lower boundary was not changed.

Industry response to the change in standards was greatest on the west coast where most of the lamb that would grade Prime and Choice was U. S. graded in both 1959 and 1960. It was only here that any change in weight or quality of lambs marketed was observed. The change in the grade standards was generally approved by all levels of the lamb industry, regardless of location. The exception was the national packers, most of whom oppose Federal grading in any form.

Both the quantity and the percentage of U. S. graded lamb and mutton increased between 1959 and 1960. Total pounds graded increased 10 percent, and graded as a percent of total slaughter increased from 35 to 37 percent. Practically all the increase in pounds graded came from U. S. Prime as the quantity of U. S. Choice increased less than 2 percent and the quantity of U. S. Good declined 62 percent.

West coast packers increased their percentage of U. S. graded and rolled lamb substantially more than in the rest of the country. The new standards were considered more realistic, except by two national packers, because more lamb would grade Prime and Choice, and retailers were considered to be more satisfied with leaner lamb stamped U. S. Choice. Some changes were also observed in production practices. About half of the west coast packers interviewed felt that lowering the standards caused some decrease in average weight with less fat because of earlier marketings. Most retailers and wholesalers surveyed were equally satisfied with the new standards.

In the rest of the United States, Federal grading also increased, mainly

due to the demand of the large volume wholesalers in New York City and the national chains. Lowering the grade standards made it easier for lamb to grade Prime and Choice even though the quantity graded in 1959 was not generally limited by the supply. U. S. Choice became a somewhat more acceptable quality range for some buyers. Also, it is often easier to sell lamb that tends to be fat and wasty if graded U. S. Prime. The pounds of Prime that were graded increased as much as Choice. Most firms, regardless of grading practices, felt the new standards were more realistic. Although the use of Federal grades is limited in the East, they are important as a basing point in buying, selling, and price reporting.

Price and demand effects of the change in standards are somewhat more difficult to interpret. One year is a relatively short time to observe the economic effects of an institutional change. Sufficient time has not elapsed for all adjustments to have taken place. Also, other important variables affecting the lamb industry must be accounted for in order to interpret the net effects of the grade change.

Regression equations were developed to explain the yearly variation in lamb prices at the farm, wholesale, and retail levels for California and the United States. Historical data from 1947 to 1960 were used. At the U. S. farm level, 97 percent of the variation in lamb prices was explained by per capita consumption of lamb, beef, veal, pork, poultry, and by personal income. Most of the variation in lamb prices was explained by beef and veal consumption, while the quantity of lamb was less significant. The predicted U. S. and California farm price of lamb was less than 2 percent above the actual price in 1960.[2] Similar results were obtained at the wholesale and retail levels. On the basis of the these regressions, there is no evidence that the 1960 change in the grading standards affected lamb prices in 1960. Lamb prices appear to be primarily determined by the supply of competing meats and consumer income.

Price differentials between Prime, Choice, and Good lamb also widened on most public markets in 1960. In Denver, the largest lamb market, Choice averaged 95 cents above Good in 1959 compared with $1.50 in 1960. Prime sold for $1.42 above Choice in 1960. Too little Prime was available to report a price in 1959. Prime and Choice generally sold for the same price at wholesale and retail in 1960. The differential between these two grades at the farm level is primarily explained by the higher carcass yield of Prime over Choice. The general widening of the price differentials between live grades gives some indication that the new

[2] The difference between the actual and predicted 1960 price was well within the difference which was expected on the basis of the standard error of this estimate. An error as large as that observed in 1960 would be expected due to change alone more than 90 percent of the time.

standards are more meaningful to the trade. Equity among producers seems to have improved by allowing the market to better reflect quality differences.

Before the change in standards, many retailers felt top Good lamb was equally acceptable to Choice on a quality basis and preferable in yield of retail cuts. The data also indicate that low Choice was preferred over top Choice by many users under the old standards. Volume of U. S. Prime under the new standards (consisting mainly of top U. S. Choice under the old standards) increased more than the previous channels using it could absorb. Prime might have sold at a discount to Choice in 1960 if some of the larger chains and other retailers had not been willing to accept some U. S. Prime with their U. S. Choice orders. Most did not prefer it and no firm surveyed switched its policy from handling Choice to Prime. U. S. Choice under the revised standards became a generally more acceptable quality range by including the more desirable parts of the former Good and Choice grades.

Summary and Projections

Lamb is a commodity in trouble, but much more than Federal grading is involved. The problems of the industry stem from the nature of the demand and the structure of the lamb market. Sales volume of lamb for most retailers is small relative to other meats. Few people eat lamb regularly and some never do. Independent retailers catering to a specialized trade used to sell most of the lamb, but they are disappearing. An increasing share of lamb is sold by retail food chains.

Most chains and supermarkets follow high and low price policies on lamb, many selling 50 percent of their yearly volume on a few special lamb sales. With a limited volume of sales at high prices, the market is highly dependent on special sales to move lamb into consumption. But even when lamb is featured, many retailers feel it is less profitable and generates less total sales per store than other meat "specials." Thus, retail food chains (which sell over 50 percent of all lamb) do not feel compelled to go into the market to buy in volume on a regular basis. This places them in an advantageous bargaining position relative to packers even though the market is more concentrated at the packer level. Packers are, however, in a substantial position to influence prices paid farmers. Ten firms account for 70 percent of the market. On a percentage basis, packers have increased their margins more than retailers in the past decade. Farmers have received lower prices.

The fortune of lamb also depends on other meats. Beef prices are the single most important determinant of lamb prices. But lamb and beef are also related through Federal grades. Many retail food chains have policies of handling only Federally graded beef and their grading policy on lamb

is usually the same. The importance of beef to chains and their importance to the sale of beef has caused a high percentage of all block beef to be Federally graded. Lower concentration of the national packers in beef slaughter and more independent packers willing to sell on a graded basis have made this possible. The national packers killing lamb are in a more substantial position to influence the way lamb is sold because of their high market share. They Federal grade only on demand and usually charge higher prices for it. Retailers with policies of handling Federal graded beef cannot always get U. S. graded lamb in the volume or at the time and place they want it. This tends to restrict the market for lamb.

Producers are also responsible for part of their problems. Those who produce larger wool-type lambs want to get the maximum return from wool as well as high prices for the meat. But the market discounts for age and weight. The old grade standards encouraged heavier weights and more fat which resulted from feeding to the Choice grade. But if the new standards continue to be properly interpreted, this source of the problem should be eliminated. Producers still face the age and weight problem from the kind of lambs produced and the length of time they keep them. The major problem of the lamb industry appears to be demand creation which means producing the kind of lamb consumers want as well as facilitating the purchase and mechandising of lamb by retailers and wholesalers in whatever way demanded. Limiting the supply of lamb carrying the U. S. Choice stamp does not accomplish this end.

The change in grade standards for lamb was generally beneficial to the lamb industry. Federal grading of lamb is also expected to increase. Many retailers did not handle U. S. Choice lamb previously because of availability, price, or degree of fat. Those who found the old U. S. Choice too fat may switch to the new Choice because it now meets their specifications. Many retailers felt there was less quality variability in U. S. graded lamb than in any private brand. U. S. Choice is the most generally recognized and accepted mark of quality. Retail merchandising and consumer acceptance of U. S. Choice beef is largely responsible. Making U. S. Choice lamb a more acceptable grade should enhance total demand by encouraging the production of lamb of this quality.

However, even though U. S. Choice may now be a more acceptable grade, availability of U. S. Choice lamb at retail will continue to be largely determined by the changing "balance of power" between packers and retailers. If the use of Federal grading increases substantially, it will take the larger food chains to bring it about under the present market structure. Entry of more independent packers into lamb slaughter would also tend to increase the use of Federal grades for lamb.

The percentage of Prime produced can be expected to decline. Demand for Prime is largely reserved to the hotel and restaurant trade plus

a few independent retailers specializing in top quality. Retail food chains with the bulk of the sales will not carry more than one quality of lamb. The cost of counter space in relation to sales as well as the problems associated with consumer satisfaction and mass advertising preclude it. We will again move toward one general grade, U. S. Choice.

Federal grades do more than separate an existing quality consist. They serve as product specifications which should shape production decisions. The structure of the market has changed to the extent that it will not profitably absorb all levels and ranges of qualities. Producers of commodities that ignore this trend will find themselves increasingly in trouble.

DISCUSSION: ECONOMIC EFFECTS OF RECENT CHANGES IN LAMB STANDARDS

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Swift and Co.

I want to focus my comment on three points in Dr. Fienup's paper which I believe, in the interest of factual accuracy, require clarification:

1. In his background discussion (which seems at times to stray far away from the economic effects of recent changes in grade standards) he states correctly that opposition to Federal grading stems from conflicting interests within the lamb industry. But he further says, "—the conflict revolves around who should do the grading and what qualities should be put in what grades." If he really believes this, with respect to the larger packers, he has missed the crucial point of the whole issue.

The conflict is not, and has never been, primarily grading at all. It relates purely and simply to the development by the USDA of a merchandising symbol "U. S. Choice," which has been developed into a potent sales instrument in direct competition with manufacturer brands. Obviously, those who find the symbol useful for merchandising purposes want U. S. grading continued and the standards broadened to include the largest possible supply of acceptable product. They, therefore, support a change of standards in the direction of liberalizing grade specifications, offsetting in major degree the primary purpose of grading, which is to group product into homogeneous value characteristics.

2. Dr. Fienup contends that "packers are in a substantial position to influence prices paid farmers" for lambs. Further, he says, "National packers are in a more substantial position to influence the way lamb is sold because of their high market share."

This is an old, old argument, for which there is absolutely no factual substantiation—even in the Supreme Court. Long ago it was discarded

by those familiar with the economics of the industry. Unless and until someone can figure out how to convert a highly perishable product like lamb to a storable product without radically reducing its value, there is no conceivable means within the law by which market share can be used to influence buying prices or selling prices. Lamb comes to market within seasons at producers' discretion. It must be sold as fresh lamb when it gets there because there is no close alternative. It is nonsense to suppose that in a system characterized by great excess capacity at all times, tied in major degree to a guaranteed work week, selling for the most part to large scale retail or wholesale buyers, and in direct competition with beef, pork, poultry, fish, that any operator could hope to continue to do business over time excepting by doing those things which cause him to be chosen in preference to his competitors, both by sellers and by buyers.

Conditions of supply and demand in a highly competitive trade, not individual operators, make both the live and the dressed market for lambs. To contend otherwise is simply to ignore the facts.

3. Dr. Fienup said that the change in grade standards for lamb was generally beneficial to the industry. This must mean that income to the industry increased over what it would otherwise have been. This, in turn, must mean that consumers were willing to pay more for lamb than they would otherwise have paid—unless Dr. Fienup wants to argue that marketing or production expenses were reduced by the grading change.

Perhaps Dr. Fienup has some evidence he has not presented.

Let me try in the remaining moments to describe why this conclusion appears quite unrealistic to commercial people:

a. Live lambs are in fact seldom if ever bought or sold on the basis of Federal live grades. A buyer usually knows what dressed meat is worth by customer specification. He has an estimated realization for by-products and an estimated cost to slaughter. He knows what orders are in hand, what specifications are attached to those orders, and what his slaughter schedule calls for. He combines all of those factors into as low a bid as he thinks will get the lambs in question, bearing in mind that he is in business every week. Now unless the change in grade standards reacted on any of these factors it would not have affected his bidding one iota.

b. The bulk of all carcass lamb is sold by slaughterers, carload basis, to large scale retail buyers or to meat wholesalers, usually to old and familiar customers, usually by telephone, with an agreed upon price attached to a commonly understood set of specifications. Those specifications usually (though not always) include some grade designation, either U. S. or private grade; they almost always specify a weight range, a condition specification, an age specification, and generally a requirement for uniformity in the lot. The buyer who

will simply accept U. S. Choice or any other broad grade designation is a rarity—and he does it knowing full well that he is bargain hunting and will probably get the low end of the grade.

Let me make it clear. Many customers are strong for the merchandising symbol that a grade designation such as U. S. Choice provides. But within that grade, most customers have their own particular specifications. The simple shift of the government standards did not in the least change customer specification, excepting for those few customers who are more concerned with the value of a merchandising symbol than they are with quality and/or cutability. So far as our observations go, customer specifications remain virtually unaltered.

But on one point I am in complete agreement with Dr. Fienup. Lamb is indeed a commodity in trouble. The essence of the trouble lies in a declining demand and in the inability of the industry to arrest that decline. No amount of manipulating of Government grade standards is likely to materially resolve the problem. I want to offer one thought: The techniques of demand creation (which is an urgent need of the industry) are most likely to be employed effectively where incentive exists for the individual firm to differentiate its product. This requires, among other things, the use of merchandising symbols associated with dependability of quality, service, and integrity.

Students of the problem must judge for themselves to what degree this type of effort is inhibited by the necessity for competing with a Federally sponsored merchandising symbol that carries the implied assurance (free from any guarantee) that Uncle Sam has looked at the merchandise and has pronounced it of top quality—Choice.

Students of the problem must also judge for themselves whether there exists in principle a justification for the Department of Agriculture to deliberately foster the competitive advantages of one segment of the lamb slaughtering industry against another, by deliberately building a merchandising symbol for those who find it difficult to build one for themselves, under the guise of a grading service.

A MERCHANDISER'S VIEW OF THE FUNCTION OF GRADES

SETH T. SHAW
Safeway Stores

IN PREPARING this paper, I assume that Dr. Mehren would have already commented on the heterogeneity in products of nature, and would have pointed out that grading is a systematic classifying of the total supply of any given product into categories of similar characteristics.

In my presentation, I wish to point out that as well as heterogeneity *within products,* there are also variations in quality characteristics, and in other characteristics from product to product. In addition, there are variations in the usefulness of grading from seller to seller, from market to market, and in other respects—so that a merchandiser's view of the functions, or of the value, of grading will vary accordingly.

A merchandiser, in looking at grading, must recognize these variations. He must of course first know what his problem is—and generally it is (a) to procure, (b) to handle, and (c) to sell his merchandise in a manner that will ultimately prove advantageous not only to himself, but also to his suppliers and customers. And at the outset, I want to emphasize the importance of a merchandiser doing business in a way that advantages accrue both to his suppliers and to his customers. For if he ignores them, or alienates them, he will not long remain in business, or certainly not profitably.

The merchandiser must then develop a program, see what tools are available to implement it, evaluate how good these tools are, and of course consider how much they cost. Here is where grading comes in, and to a most important degree—but with important variations from product to product, from function to function, from seller to seller, and so on.

Procurement vs. Handling vs. Selling

On the *procurement* side of retail operations, standardized, third party grades and grading both permit and promote the practice of buying on description or specification, without personal inspection by the buyer of each lot of product prior to purchase. This use can be made of grades which carry little or no consumer significance. And it is probably in this area that grades have been most highly promoted by Government officials in charge of these services. To the retailer, this use represents very real cost savings in buying supplies. It eliminates, or at least lessens, the need for trained buying personnel to go out and inspect each lot of product. The offsetting charge for the grading service ordinarily is substantially less than the alternative cost.

In the *handling* category of retailer operations, grades may provide a preliminary sorting of product by quality and/or size, or yield, entirely apart from their direct consumer significance. Even under circumstances of sale of prepack of fruits and vegetables under a private label, grading may be of sufficient value to the retailer to more than justify its cost.

Finally, on the *selling* side of retail operations, Government grades may –not necessarily, but may–have an important bearing upon the retailer's merchandising operations. Since it is the *merchandiser's* views and possible applications of grading that is the topic of this paper, it may be well to define the term before we go further.

"Merchandiser" is used here in the context of one charged with developing plans related to the retail *selling* function. He is in close contact with those responsible for procurement, as well as with those supervisors who see that merchandising plans are carried out at the store level. But it is the merchandiser who has the basic responsibility for determining what goes in the weekly price advertising, and his merchandising plans are developed to support the advertisements. He furthermore directs the preparation of in-store point-of-sale promotion material, special displays, tie-in items, and so forth.

It is with primary relationship to these *merchandising* functions that the following comments regarding grading are meant to apply.

Variations in Grading From Product to Product

Not all products are graded the same–in the same way, by the same criteria, or for the same purpose. And therefore, grading does not have the same significance or usefulness to the mechandiser, for all the products he may handle.

For example, it is conceivable that the factors on which beef grades are determined consist of characteristics which are of considerable importance to the retailer and to the consumer, yet the same characteristics may not have the same significance in the case of lamb. Consequently, beef grades may serve a very useful purpose in a retailer's merchandising program, while lamb grades may not be needed at all.

Nor do grade standards serve the same purposes between products so far as the retailer is concerned. A Government grade or a packer label would not mean much on a display of fresh tomatoes or pod peas. The homemaker usually can see at a glance whether the product appeals to her, and probably no grade tag would lead her to think the product was either better or worse.

Variations in Origins, Criteria, and Purposes of Grading

Grades of farm food products are by no means a consistent, uniform code of product descriptions. Different standards and different techniques are applied in grading. Historically, they have generally grown from in-

dustry practice, and have been developed and administered by *commodity*-line agencies which have made little effort to obtain comparability with other products in criteria, objectives, methods, or terminology. Retailers, by and large, must take grades as they happen to fall, product by product, and this explains a large measure of the differences among products in the actual use of grades by retailers.

Meat grades, for example, were developed with special reference to *consumer* use, and with provision to transmit the price-expression of consumer preference back to the farmer, breeder, and feeder through a system of matching grades for live animals. Small wonder, then, that retailers found meat grades comparatively well adapted to their selling operations to consumers.

Furthermore, products are graded according to the function that such grading is expected to perform. The whole "grading" question has been clouded because grades are often used for purposes completely unrelated to the product characteristics on which they are based. A grade designed to classify a fruit or vegetable for purposes of pricing to a cannery may not serve a similar function in the fresh market. Beef is graded on the basis of those characteristics associated with eating quality, but the industry has been trying to use these grades as a basis for trading at the wholesale level.

Let's look at potato grades—there is no difference in the eating quality of U. S. No. 1 and U. S. No. 2. The difference is largely a matter of ease of peeling and freedom of waste.

So when we talk about grading in relation to merchandising, I think we have to direct our discussion to specific products and look at the characteristics used as grade factors to determine what significance such factors may have to the ultimate consumer.

There has been debate, verging on the acrimonious, as to whether or not the final criterion of grading should be the consumer's preferences. Some persons argue that grades are fundamentally and primarily product descriptions for industry-use in trading and processing, and that their use for consumer information is a distortion of their basic and original purpose.

In the proposed "dual grading" for beef carcasses, the supplementary "cutability" term should be valuable to retailers in their procurement, and perhaps in their handling, but it would lose its meaning in the merchandising of "standardized trim" retail cuts.

But, for the majority of food products which preserve their form during the marketing process, the grade label, if it has any value as a merchandising aid, should carry information and assurance through to the consumer level.

I am not discounting the fact that retailers do often attempt to merchandise "grades" that have no real consumer significance. It is probably

because they have met with success in merchandising "grades" which *are* in fact consumer oriented, such as those for eggs, milk, butter, and beef. The grade factors for these commodities are related to eating quality and wholesomeness. On the other hand, grades for apples, potatoes, and tomatoes, have nothing to do with either eating quality or wholesomeness. Sure, there may be a higher yield in the kitchen from the higher grade product, but I doubt if the housewife needs such a quantitative evaluation. She's pretty sharp herself on this score. She wants qualitative evaluations on those products when she either doesn't know quality (beef) or when she can't see inside the product (eggs).

For those farm food products for which product quality is not substantially altered by processing, handling, etc., and where qualitative factors cannot be easily observed, yet can be measured, I would argue in favor of grade standards fundamentally geared to the ultimate consumer. The end objective of the entire production and marketing process is consumer satisfaction.

Yet on the other hand, as mentioned earlier, some food products are so standardized, blended, or altered by the manufacturing, preparation, and handling processes that the quality rating of the original farm product loses its significance. For example, vegetable oil products may be derived from cottonseed and soybeans of varying grades.

The present beef grades were originally conceived as quality standards. They attempted to classify beef carcasses into categories of eating quality. They were not called #1, #2, #3, or A, B, C, etc., because this would imply that #1 was better than #2 or that A was better than B. It was recognized that Prime was *different* from Choice beef, and so forth, but not necessarily *better,* except that certain cuts were better for certain uses. It was also recognized that it costs more to make Prime beef than Choice—therefore, it wouldn't be produced unless someone wanted it enough to pay the higher price.

The standards based on those characteristics which we think are most closely related to eating quality of beef have served the retailer very well so far as his advertising, merchandising, and customer acceptance (measured by repeat purchases) are concerned. It has been in the area of purchasing that the present beef grades have their greatest weakness. For example, there is usually a $2 or $3 per cwt. spread between Prime and Choice, and between Choice and Good, but there may be as much as $12 per cwt. difference in value within the Choice grade.

I don't mean to suggest that grades geared to eating satisfaction are of no value for procurement purposes. They are of value, but the grades should be recognized for what they are, and they need augmenting by retailer specifications for purposes of pricing at wholesale. It should also be noted that the quality factors used in beef grade determination have merchandising significance for reasons other than eating quality. They include

eye appeal, bright red lean contrasted with creamy white fat; longer case life because of ability of the meat to hold its bloom; a higher water-binding capacity to prevent bleeding or loss of tissue fluids; and the ability of the meat to take aging for additional tenderness.

Variations in Sellers

It should also be mentioned that just as grade criteria and products differ, so do sellers at wholesale and retail. These differences in sellers profoundly influence the value and use of Government grades. A local processor may have considerable local demand but he may not have, nor want, sufficient product to reach out to more distant markets. He personally services his accounts, and his customers are well acquainted with his products.

At the other extreme, we have the large processor with national distribution. That firm must advertise to presell retailer customers and ultimate consumers on its products. If it sells through brokers, the firm itself may never have any contact with its retail customers.

There are literally hundreds of gradations between these extremes. My point is that not all processors have the same need or use for a standardized, third party grading system.

We also need to recognize that the processor may need grades for procurement purposes that would have no meaning as consumer grades. This is one reason why grade labeling of consumer packs of canned fruits and vegetables has never gotten off the ground. The grades by and large were producer-oriented in their inception and have had little or no meaning as consumer grades.

Nor are sellers at retail homogenous. At the one extreme, we have the single store or small chain operating in one city. The proprietor knows meat or produce or what have you, and has, over a time, established a fine quality reputation with his customers. He does his own selection—pays whatever price is necessary to get what he wants. He doesn't advertise, and he relies on personal selling. He actually has little need for Government grading.

At the other extreme we have the large retail food chain with national distribution. Its product requirements are large. It must procure supplies from a wide area. But it wants uniform quality. Many different people have the buying, pricing, and merchandising responsibilities. These people operate within the framework of company policies. Procedures as well as product quality and pricing philosophy are covered by policy. It is easy to understand why large firms need some nationally uniform quality standards, with disinterested third party grading, in order to protect the company's quality reputation against that employee who may be willing to sacrifice quality for immediate price or profit.

We should also recognize that there is considerable heterogeneity be-

tween market cities and within market cities. Also, consider the heterogeneity in people—their preferences, customs, and places of origin. A Government graded product may present advantageous merchandising opportunities in some areas, or with some groups, but not at all in others.

Summary

With all of these variations in products and in criteria for grading—as well as in handlers and customers—it would be inappropriate (if not impossible) to generalize that Government grading is either good or bad from the retail merchandising standpoint.

One retailer, for example, may be better served by a packer label—for a given product, or for an entire product line. Another retailer may do well to develop his own label and personally inspect and enforce it. A third may be better served by Government grades.

The clincher for each merchandiser is: What do I want to do, and what tools are available to me? And then he must consider how good the tools are and how much they cost.

Grading is one of the tools—among many—available to the merchandiser. A merchandiser therefore looks at grades to determine whether they contribute to the job he has to do, namely, selling product, competitively, at a profit. He must therefore ask:

1. Does the grade reflect those product characteristics related to consumer satisfaction?
2. Does the grade tell the customer something about the product which she cannot readily observe?
3. Does the grade have sufficient meaning to the consumer that she will buy with greater confidence?
4. Does the grade differentiate the retailer's product, or merely identify its conformity with that offered by competing retailers?
5. Does the advertising of grade as well as price give the consumer a better opportunity to compare values between retailers?
6. Will advertising of grade and price adequately describe the product —or must further selling information be conveyed to the buyer?
7. Does grade identification help the merchandiser keep competitive in price?
8. How much does grading cost?

A merchandiser's view of the function and the application of Government grades, or of any other grading system, must contain a critical evaluation of all of these questions. No general answers can be given. It requires a separate analysis, product by product, seller by seller, and market by market. And finally, it requires frequent re-examination, as changes occur in the character of supplies offered, in consumer demands, and in the standards and techniques of grading.

DISCUSSION: A MERCHANDISER'S VIEW OF THE FUNCTION OF GRADES

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The function of grades, so far as the retailer is concerned, is to contribute to the solution of his basic profit maximizing problem. The merchandiser is more concerned with the use of grades as a tool in manipulating the consumer. But it would be inappropriate, if not impossible, to generalize regarding the value of Government grading as a tool in retail merchandising. This conclusion is supported by the wide variation found in grading from product to product, in origins, in criteria, and in purposes of grading, in merchandisers and their programs, and in consumers. Grades, even those which carry no consumer significance, may be useful to the retailer in reducing procurement or handling costs. But in merchandising, the usefulness of grades is related closely to their potentials for carrying information and assurance through to the consumer level. The implication is that too often uniform grade standards are meaningless or unimportant to the consumer and, therefore, useless in merchandising.

These, essentially, are the central views expressed by Mr. Shaw and, as such, they appear sound and typically frank and straightforward. Any rational private businessman, whether he is a farmer, a processor, or a retailer, must consider the effects and value of an institutional arrangement such as grading on his profits through effects either on costs or returns. Small wonder, then, that objectives sought and criteria offered for use in defining grades vary so widely.

Some of the subsidiary, related statements made by Shaw are more subject to question. For instance, it undoubtedly is true that a retailer must avoid alienating either his suppliers or his customers. But Shaw, I think, would be the first to admit that the interests of the retailer, particularly in the short-run, are not identical with those of his customers and suppliers. Merchandiser's interests may be as well served by grades which consumers can be made to believe carry significance for them as by those which actually do carry such significance. I doubt, therefore, that the typical merchandiser asks the questions posed by Shaw in his summary with quite as much consumer interest orientation as he ascribes to them. Concerning procurement, the retail buyers' interests sometimes are best served by grades which can be used effectively as bargaining tools, which increase supplier costs, or which force structural adjustments among factor markets.

As another example, I doubt that the usefulness to consumers of uniform third party grading is confined to situations in which the consumer

admits he doesn't know or cannot readily determine quality. Consumers frequently are erroneously led to believe that particular visual characteristics are associated with eating quality, viz the bright red but hard and tasteless apple. Nor am I convinced that the usefulness of quality grading is confined to fresh products. Many manufactured products vary considerably or, perhaps, should vary more in eating characteristics.

Many, I suppose, would question bases for statements such as the one in which Shaw refers to the beef grades as quality standards. I find myself more concerned, however, with several more basic considerations.

Although economic policy guides are urgently needed in the area of uniform or standardized third party grading, the papers delivered here today and recent literature seem to offer little hope for immediate progress through economic research. Shaw illustrated the basis for differences and variations in criteria for grading. He raised some related questions with respect to price differentials within and between grades of beef, but offered no suggestions for improvements. Mehren also dealt with the varied purposes and uses of grading and with the question of criteria for the definition of grades. He seems to say that although there is a place for grades in an affluent society, we have neither the conceptual nor the empirical bases needed to determine criteria for optimum specifications, grade combinations, or variations over time. Thus, neither paper is particularly constructive on these points. Recent consumer studies, it seems to me, have made relatively little contribution to solution of questions associated with development of criteria for grading.

As Mehren suggests, there are no "pat" answers. I believe, nevertheless that through continued research, on both the conceptual and empirical planes, we can and will develop more precise economic guides to solution of the principal problems associated with grading than presently are available.

Grading, inevitably, is a compromise between the increased utility associated with making buying and selling decisions in markets of relatively few and reasonably well standardized products and social gains associated with greater product variety. Selection from among alternatives in this situation rests partly, perhaps largely, on noneconomic considerations. Economists can, however, explore implications of alternatives with respect to operational and pricing efficiency.

Grade standards represent a choice from among alternative combinations of quality indicators and attributes. Given the wide variety of goals and purposes sought in grading, economics, again, probably cannot be expected to dictate the final selection. But economists can spell out implications associated with alternative definitions and concepts associated with the term "quality." They can determine attributes that are imporant to consumers, among different groups of consumers, and in various use

categories. They can determine the relative importance of the attributes and estimate effects of variations in these attributes on prices and values. It is seldom possible or practicable to include all quality factors and other factors affecting price differentials among those selected as criteria for grade definition. Accordingly, the "weakness" mentioned by Shaw with respect to use of beef grades in buying exists not so much in the grade standards as in people who expect grades to explain all price differences.

Grading is a compromise, also, between minimizing the product variation within each class or grade with respect to attributes finally selected and minimizing the cost in terms of time, effort, or dollars required in making and maintaining the segregation. Both product variation and costs, presumably are measurable.

Effects of grading on market structure and market power and possibilities for use of grading as an adjustment tool can be explored more fully. If grades are expected to perform their classic functions of providing guides to the allocation of expenditures and of production and marketing resources, some effects on market organization and structure must be anticipated. Thus, we cannot expect to devise systems of grading that are advantageous to everyone concerned. Economists can, however, point out (in some instances predict) individuals and groups that are hurt and those that are helped. Even in the absence of price or supply manipulation, grading apparently can be made a rather effective adjustment tool. I venture the opinion that the major meat packers who so roundly criticize the Federal grading of beef and lamb enjoy better economic circumstances today than if they had not been forced, partly by grading, to begin adjusting their operations to the realities of modern-day production and merchandising. In addition, grades, through a tendency toward an equalization of knowledge among the various levels of the trade, seem to encourage structural adjustments in the general direction of the competitive ideal.

Instead of continuing to test the consumer acceptability of one grade against another, economists can begin testing effects of alternative systems, numbers, and sets of grades on aggregate demand for the product, marketing costs, production costs, net returns to producers, and allocative efficiency of the marketing system.

CONTRIBUTED PAPERS: CONSUMPTION, MARKETING AND PRICES

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A QUEUING THEORY APPLICATION WITH TIME-DEPENDENT PARAMETERS[1]

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OF THE many queuing theory applications recently appearing in the literature, practically all assume that average arrival rates are constant over time. One reason for this assumption may be that it greatly simplifies the method of solution. If constant arrival rates are assumed, the estimates of such variables as waiting time and length of line can be obtained by simple algebraic manipulation of probability statements.

Once the assumption of constant average arrival rates is dropped, however, the direct mathematical solution entails the evaluation of a Bessel function. Since this requires more mathematical training than most researchers possess, only two alternative approaches are available: (1) Variability in arrival rates can be ignored and the simple algebraic solution can be used despite the presence of a bias of unknown magnitude or (2) the queue can be simulated with Monte Carlo procedures.

The latter method involves the generation of (synthetic) random arrivals from the estimated (or known) probability distribution of arrivals, the manual assignment (on paper) of the arrivals to the hypothetical service facility, and the maintenance of a record of dock occupancy and waiting time. While the simulation method is less elegant it has the advantage of being applicable to a wide variety of problems involving stochastic processes.

A research attempt to select appropriate plant loading facilities for fleet milk distribution trucks[2] led to the solution of a queuing problem. The cost of additional loading facilities was balanced against the cost of waiting time to arrive at the least combined cost. A 7-day sample of truck arrivals at a plant dock indicated a Poisson probability distribution of arrivals, variable average arrival rates, constant service times and a first come-first served discipline.

Each loading technique studied had different service times and hence

[1] An abstract of a paper published with the approval of the Director of Research, N.C. Agr. Expt. Sta. as Paper No. 1347 of the Journal Series.

[2] The research on which this research is based is described in Simmons, Richard L., *Case Handling Costs in Fluid Milk Plants*, N.C. Expt. Sta., A. E. Information Series No. 81, Dec. 1960.

different queues. Only one queue will be discussed here—one in which 31 trucks arrive for loading between 11:00 a.m. and 5:00 p.m., each truck requiring 8 minutes to load. If the average arrival rates are assumed constant, the total waiting time is estimated by the following equation[3] to be 274 minutes.

$$E_{(w)} = \frac{\lambda}{2\mu(\mu - \lambda)}$$

where $E_{(w)}$ = estimated waiting time,

λ = average arrival rate in trucks per minute, and

μ = average loading time in trucks per minute.

However, if the simulation procedure is used and variable arrival rates are accounted for by using different arrival rates for each hour of the afternoon (and carrying over waiting units into following time periods), the estimated waiting time is 675 minutes. The discrepancy in this case is large because the arrival rates in the middle of the loading period were quite high, dwindling off rapidly in later hours. Once a queue is formed the service facility is slow to recover. Generally the discrepancy between the estimates derived by the two methods illustrated will be greater the more variation in arrival rates is present. Thus, it seems a worthwhile formality to check for constancy in arrival rates before choosing the estimation procedure.

[3] Sasieni, Maurice, *et al.*, *Operations Research: Methods and Problems* (New York: John Wiley and Sons), 1959.

STORAGE DEMAND FOR A PERISHABLE: POTATOES

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This paper is concerned with (1) examining the effect of sustained month-to-month price changes and other variables on storage demand for potatoes and (2) making a tentative appraisal of the relation between storage operation and returns to storers.

RECENT price movements, the level of storage holdings in the previous season and the volume of initial stocks are important factors influencing out-of-storage movement of potatoes. The period of heaviest movement occurs after January 1. Month-to-month changes in prices appear to speed up or slow down the rate at which potatoes move out of storage.

Hypothesis To Be Tested

It was postulated that storers tend to sell potatoes from storage following a sustained price increase and tend to hold them following a sustained price decline. In this study, successive month-to-month price changes in a given direction were used to represent sustained price increases or declines. The period of heaviest movement out of storage, January through April, was selected for analysis. However, the period selected for monthly price changes was November through April; November–December and December–January price changes were assumed to affect decision-making in January and February. It was also hypothesized that in the storage period producer-storers weigh sustained price increases or decreases against costs incurred at given points of time.

Results of Analysis

The following storage demand relation was fitted by least squares using data for 1951–60. Numbers in parentheses are standard errors of the respective regression coefficients.

$$S_t = -31.019 - \underset{(0.012)}{0.030}\,\frac{\sum_{i=1}^{5}(P_i - P_{i-1})}{I} + \underset{(0.256)}{0.643}\,S_{t-1} + \underset{(0.061)}{0.438}\,S_J$$

$$s_{1.234} = 1.6 \qquad R^2_{1.234} = 0.91$$

S_t is estimated quantity of potatoes in storage on May 1 in year t;

* The author is indebted to Anthony S. Rojko and Will M. Simmons, Econ. Res. Serv., USDA, for helpful comments and criticism.

$$\sum_{i=1}^{5} (P_i - P_{i-1})$$

is the summation of only the successive monthly changes in potato prices received by farmers (P) which moved in the same direction, where $i=1=$December, $i=2=$January, $\cdots$, $i=5=$April; I is the consumers price index; S_{t-1} is S_t lagged 1 year; and S_J is estimated January 1 stocks of potatoes, adjusted for quantities diverted under government programs.

All of the regression coefficients have the expected sign and are significant in a statistical sense. The coefficients for sustained change in monthly prices and previous May 1 level of stocks differ significantly from zero at the 5 percent probability level. The coefficient for January 1 stocks was significant at the 1 percent probability level. The elasticity of storage demand was found to be -0.47. The results support the hypothesis that storers tend to sell following a sustained price increase and to hold following a sustained price decline.

Relation of Storage Operations to Returns

For the period 1951 to 1960, the summation of successive monthly price changes which moved only in the same direction, between November and April, showed an average increase of plus 37.0 cents per hundredweight. Storage costs per month in the postwar period were estimated to be 5 cents per hundredweight or total costs of 30 cents for the 6-month period. The difference between average gross gain (37.0 cents) and the estimate of storage costs (30.0 cents) leaves an average net gain of 7.0 cents per hundredweight to the storer who sold (or held) potatoes following a sustained price increase (or decrease).

Results of the study suggest that sutained price changes have the effect of speeding up or slowing down out-of-storage movement. The analysis indicated that over an extended period of years, price increases during the storage period tended to cover storage costs.

SPATIAL PRICING ACCURACY AND PRICE RELATIONSHIPS IN THE MARKET FOR SLAUGHTER HOGS[1]

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The paper summarizes the results of an inquiry into the nature of the spatial pricing mechanism for slaughter hogs in a market area presumed to be of national scope. The inquiry sought to examine (1) price relationships between markets; (2) the affect of a national pricing system upon the pricing functions and market areas of individual markets; (3) daily price patterns existing between country and terminal markets, and (4) relationships between nationally-quoted wholesale prices for pork cuts and the price of live hogs. The study was designed to provide evidence bearing upon two hypotheses: (1) The pricing system, over time and on the average, permitted no price advantage to patrons of terminal markets, and (2) although terminal markets might serve in a price-registering capacity, they were not dominant price-establishing influences.

CORRELATION and regression analysis and measures of significant difference at the .01 level were employed in analysis of prices paid at the Indianapolis Stockyards and 25 surrounding daily hog markets in central Indiana. Three 2-week periods were used in an examination of 30 daily price observations at each market for slaughter hogs ranging in weight from 180 to 270 pounds.

The geographic distribution of slaughter hog shipments from Indiana markets suggested the existence of a national market which might be expected to display the spatial price uniformities characteristic of a competitive market area. The total patterns of distribution for both terminal and country markets were geographically similar and the country system was not in a position requiring dependence upon any Indiana market as a dominant price-establishing influence.

Tests for significant difference at the .01 level between country and terminal prices were conducted on the basis of gross prices less marketing charges. When adjustments were made in this manner, comparisons generally showed terminal net prices to be significantly higher. Further comparisons were made in terms of net spatial prices which involved an additional adjustment for transportation costs between country areas and

[1] The empirical basis for the paper was derived under Purdue Agr. Expt. Sta., Project 874. The analysis was completed at Purdue Univ. under the author's supervision by Richard L. Feltner in fulfilling the requirements for the degree of master of science.

[2] The author is indebted to R. L. Feltner, V. W. Ruttan, F. E. Walker, and L. T. Wallace, Dept. of Agr. Econ., Purdue Univ., and to F. B. McCormick, R. O. Olson, J. R. Tompkin, and H. C. Williams, Dept. of Agr. Econ., Ohio State Univ., for helpful comments and criticism in drafting the paper.

the terminal location. Such comparisons generally found terminal prices to be significantly lower. That the terminal may establish prices for a specified area is plausible, but this appears only to occur within a distinct area, the limits of which are determined by the maximum transportation cost that a terminal can compensate for; and country markets generally were located beyond these limits.

Correlation and regression analysis using net prices and first differences in net prices were employed in an investigation of terminal-country price relationships and daily price patterns. Coefficients of determination using net prices were high for both unlagged and one-day lag relationships, although the unlagged associations appeared to be more satisfactory. Analysis of first differences in net prices permitted substantial confirmation that country and terminal prices tended to change in similar amounts, moving in the same direction on the same day.

Estimates of wholesale carcass values were computed, using the nationally-distributed price quotations of the National Provisioner Yellow Sheet. Correlation and regression techniques were employed using gross terminal and country prices as dependent variables in relationships with estimated wholesale carcass values. A high degree of association existed between live hog prices at Indiana markets and wholesale carcass values. Relationships were somewhat higher on an unlagged basis. Analyses were also based upon first differences in prices and wholesale values. No relationship was apparent on either a lagged or an unlagged basis indicating that, while wholesale values may have a definite influence on live prices over time, there may be inaccuracy of substantial proportions in the day-to-day determination of live hog prices.

CREATING A PRODUCT IMAGE–IMPLICATIONS FOR MARKETING AGRICULTURAL PRODUCTS

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THE BASIC assumption of this paper is that in our economy producers of goods must bear responsibility for the consumption of their goods. There is now substantial evidence indicating that, for many commodities, volume sales are often associated with directed consumption and intentional creation of consumer demand. These phenomena may be initiated and influenced by creating favorable product images.

Major Basic Postulates of Creating a Product Image and the Attendant Conclusion

(A) An attitude is preparation for behavior. A composite of attitudes which individuals and groups hold toward a product constitutes a product image. Influence people's images and you influence their behavior.

(B) People have hidden urges or desires buried in the sub-conscious areas of their minds. Build an image around a product that will satisfy these needs and people will buy the product.

(C) Attitudes are associated with reference points which are bases for people's preferences, judgments, and comparisons. These reference points may be established by external factors or internal factors. Stimulate favorable reference points regarding a product and people will develop a better image of the product.

The foregoing premises and conclusions are oversimplifications of a complex situation but help clarify the following essential principles of creating product images.

Some Essential Principles

(1) *A first principle involved in creating a favorable product image is: people are not perfectly rational creatures.*

Consumer behavior is usually not determined entirely by knowledge and conscious logic. Feelings and unconscious drives are also involved. A desirable product image must cater to both the "rational" and "irrational" needs of consumers.

(2) *A second principle is the need to determine the reference points and attitudes already existing in the minds of particular groups or a society.*

To build upon a compatible image, or tear down an unfavorable one, the builder must know what image already exists in people's minds. The

need for such knowledge has given socio-psychological research new status. That is why consumer research is being widely used by marketing management. Product promotions should capitalize on favorable existing reference points.

(3) *A third principle is: place the desired image in the most favorable setting. If at all possible clothe it in the already accepted values of the people.*

(4) *People respond to situations in ways that appear to them as a protection of their self images.*

Human beings have emotional foundations which undergird their behavior. To attack or threaten an individual's behavior upsets the equilibrium of his psychological foundations. Promote a product in such manner as to protect the consumers' self images and they will more readily buy it.

(5) *Present the image in a form whereby it will dispel anxiety or doubts.*

People buy "security" in a product.

(6) *To stimulate development of a favorable product image one must attract the attention of large numbers of potential consumers.*

The foregoing principles are some of the major ones involved in creating favorable product images but do not include all of them.

Can these somewhat abstract theories and principles be applied to the marketing of agricultural products?

First of all, the authors realize that the demand for agricultural products on the basis of a national aggregate is relatively inelastic. However, there are other considerations indigenous to our economy which the authors consider worthy of further thought. For example, (1) some areas have a comparative advantage with respect to specific commodities, and producers of such commodities may consider it economically beneficial to stimulate greater consumption of their products in a specific market; (2) farmers may find it more profitable to sell meats which have a more elastic demand than the equivalent volume of grain products having a less elastic demand; (3) competition among producer groups, states, and regions is a reality, therefore, these agents try to maximize their profits by differentiation of locally produced commodities; (4) several agricultural food and fibre products compete with synthetic products that are close substitutes; and (5) creating favorable images for U. S. agricultural products in foreign markets may stimulate exports. These possible applications of image building to the marketing of agricultural products may stimulate further thought and discussion on the subject.

SOME SIGNIFICANT ASPECTS OF PROFITS IN FOOD MARKETING

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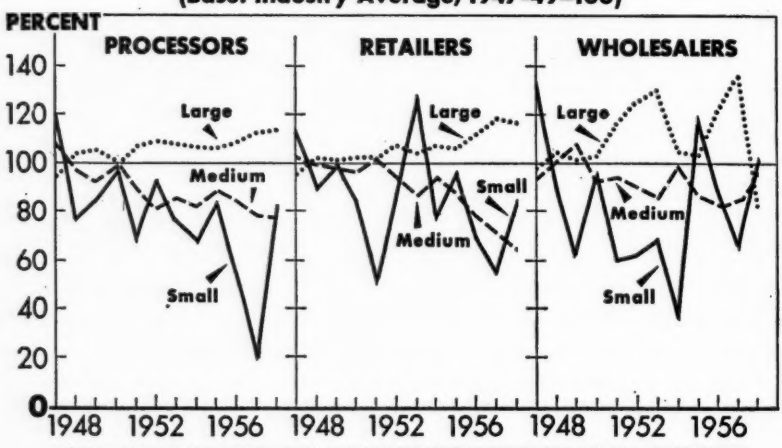
INDEXES OF profits per dollar of sales for food processors, retailers, and wholesalers as a whole reveal a striking similarity in movement over the 1947-58 period. This suggests that profits in all three segments were responsive to basically the same underlying forces. But

Figure 1

RELATIVE PROFITS PER DOLLAR OF SALES, U.S. FOOD MARKETING CORPORATIONS, 1947-1958 1/

(Base: Industry Average, 1947-49=100)



1/ THE 1958 DATA ARE AFFECTED TO AN UNKNOWN DEGREE BY A RATHER EXTENSIVE RECLASSIFICATION BY THE INTERNAL REVENUE SERVICE.

underneath were sharp divergencies in profits among firms of different sizes as shown by indexes (figure 1). Profits of the large firm improved relatively.

[1] The views expressed in this paper are those of the author and do not necessarily represent the views of the Marketing Econ. Div. Econ. Res. Serv. or the USDA. The author thanks Allen B. Paul and William H. Waldorf for helpful comments.

This paper analyzes corporations only, and is based on data from the Internal Revenue Serv. Food marketing corporations are classified on the basis of total assets. Processors: *Small,* those firms having assets of less than ½ million; medium, assets of ½ million to under 10 million; *large,* assets of 10 million and above; retailers and wholesalers; *small,* those firms having assets of less than ¼ million; *medium,* assets of ¼ million to under 5 million; and *large,* assets of 5 million and above.

TABLE 1. CHANGES IN SELECTED FINANCIAL RATIOS, U. S. FOOD MARKETING CORPORATIONS FROM 1947–49 TO 1955–57

Size of firm	Net worth to sales			Debt to net worth		
	Processors	Retailers	Wholesalers	Processors	Retailers	Wholesalers
Small	−17	−34	−13	+30	+56	NA[1]
Medium	− 6	−18	−13	+20	+41	NA
Large	+10	+12	0	+19	+26	NA

[1] NA—Not Available.

Does this divergence identify the least profitable size firm and/or indicate how rapidly it is being squeezed out? Has the survival of medium and small firms become increasingly more difficult? To answer these questions consideration must be given to other factors which might account for the observed trends.

First, the accuracy of reported profit data needs more study; tentatively the author judges they indicate profit behavior reasonably well. Second, do the increased profits of large firms simply reflect an increase in their use of equity capital? A preliminary answer is provided by ratios of net worth to sales (table 1). These ratios suggest that changes in the use of equity capital have contributed to the divergence of profits.

However, changes in equity alone do not cover all the changes in financing. The ratios of debt to net worth (table 1) suggest that small firms have become progressively more dependent on borrowed funds than have large firms.

These data raise basic questions about the impact of technological change on scale economies and the role of small firms in the competitive struggle. By gaining insights from systematic research on these questions, reliable perspective can be attained on the kind of structural readjustments that are yet to come and the possibilities and wisdom for their modification.

THE SCOPE EFFORT OF EXTENSION AND AGRICULTURAL ECONOMICS

CHAIRMAN: ROBERT W. WILCOX, UNIVERSITY OF IDAHO

IMPLICATIONS OF THE SCOPE EFFORT TO AGRICULTURAL ECONOMICS

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University of Massachusetts

THE COLLEGES of Agriculture are widely recognized for their contributions to agriculture's productive efficiency, and to our nation's low cost, safe and abundant food supply. They are recognized also for contributions to general improvement of rural communities and farm life, and increased opportunities for rural youth. In relation to past problems, they have proved themselves. Now they brace to demonstrate that they can make equally important contributions for the kind of world in which we live today. This is a challenge to all parts of the agricultural college system—resident instruction, research and Extension.

While resident instruction is screened by classroom privacy and academic freedom, and while research operates behind ramparts provided by the mysterious and sacred aura of science and by the professional societies, Extension Service performs on the front line without benefit of cover. In such a position, Extension Service receives the first shock of attack and openly maneuvers for strategic ground.

Extension is engaged today in such maneuvers, and the whole organization is involved in movement for a realignment and recommitment of its resources.

Basic changes in our agriculture and our society that you as economists have helped bring about are forcing all agencies serving agriculture to reappraise their objectives, their organization, and their programs. In Extension, the Scope effort is one phase of this process. While economists have played important roles in developing the process, the results also indicate new opportunities for them. The success of new program efforts will depend rather largely on economists, for economics is at the heart of many of today's problems.

My remarks will be directed to the national Scope effort, and its general significance. I will also discuss some of the implications to agricultural economics, confining my effort to a broad view of the more general implications as seen from one extension director's point of view.

I am sure that you are aware of the two national publications referred

to as the "Scope Report" developed by extension administrators and staff, and similar publications prepared in several States. These efforts are related to "program projection," a process in which lay people helped develop adjustments in Extension's programs. This, then, is what I conceive of as the "scope effort"—an internal effort of the Extension Services to define the *scope* of its responsibilities in relation to legislative intent and needs expressed by lay people.

It is intended as a statement of *scope* of extension program responsibility today in terms of clientele, problem areas, and subject matter, without indication of priority of emphasis. However, a sense of intended priority can be inferred from the selection of the nine ideas around which the report was constructed. One might also observe that decisions concerning the allocation of resources within the total scope are at least as important as scope of effort.

General Significance of Scope Effort

The Scope effort comes at a time when magazine editors, university administrators, farmers, and others are questioning the future role of the College of Agriculture, when our country enjoys unprecedented affluence on the one hand and, yet, some segments of agriculture are on the verge of poverty. All levels of Government are having difficulty raising sufficient revenue for important public services. Some legislative bodies have reduced appropriations for agriculture. Coming at such a time, the Scope effort is a demonstration to the public of Extension's interest in important problems of today and the future, and its interest in making efficient and effective use of public funds. This is one of the more import values of the Scope effort.

If one looks at the history of extension programs over the past several decades, he finds a history of substantial shifts in emphasis with changes in national and local problems, demonstrating a considerable degree of flexibility for such a large organization with such decentralization of authority. But perhaps this same decentralization, placing heavy responsibility at the lower echelons, makes the organization responsive to needs. Such decentralization also provides for the combined judgment of many people on questions of emphasis among broad program areas.

At times, we wish the organization had a greater flexibility; we wish it could change more rapidly in response to changing needs. A number of rigidities in our system limits its flexibility. One of the more important of these is the rigidity of internal organization of the College of Agriculture.

While it is difficult to generalize about Colleges of Agriculture, many have an organization, developed early, to facilitate operations effective under conditions of that early time, an organization that has changed little in recent decades. The needs of today may be better served by a

different organization of resources; in a long established pattern of organization and operation there are internal forces limiting the speed with which resources may be redirected with changing needs. I propose that administrators must take a new look at the way we are organized—in the field and on the campus—and, where appropriate, develop a new organization to facilitate the kind of program needed today.

The Scope Report is significant because of its effects on the individuals who wrote it. The people involved were generally administrators or other key people. In the process of preparing the Report, they were obligated to study the problems of our society and the effectiveness of extension programs. This has been for them an educational experience that should have its significance in more rapid program adjustments.

A third type of significance is in the effect on our clientele and the general public in revealing to them the scope of extension responsibility seen from a national point of view by a group of extension workers.

A Basis for Program Development

Let us now turn our attention to some challenges of the future. The following are some of the principles on which I base this analysis. If extension programs are to continue to receive public support, they must make real, recognizable, and significant contributions to the solution of real and important problems in which there is a substantial public interest. There is a great public interest in programs with a direct economic impact. Today, our support comes largely from the agricultural and rural community, but additional and broader support develops when our programs have the kind of impact indicated. People and firms in the social and economic systems with which we work have problems for which they need and want the kind of educational assistance our organization can provide. As systems change, so does the nature of the problems. Changes in the nature of the problems require changes in the amount and qualities of educational inputs for their solution. The problems of people, however, do not fall neatly into academic departments. As people seek assistance, they see no cause to recognize our departmentalizations or to differentiate between the functions of research and Extension.

With these principles in mind, we must recognize the changes that have taken place in the society we serve; the problems that are of real public concern today, and the needs of the people in dealing with their problems. The volume of data on needs and problems are familiar to you.

A Broad Range of Competencies Is Required

These principles and needs suggest such questions as these: Can we work effectively with marketing firms operating in an imperfectly competitive society without emphasizing the psychological and social considerations in the strategy of imperfect competition? Can we have an im-

pact on "community improvement" and "resource development" without a basic understanding of the social and economic considerations plaguing the minds of the local decision makers? Can we work on conservation and the use of natural resources without considerable knowledge of social and psychological forces at work in the urban community?

Such questions lead to the broader question: whether we are staffed or organized to do alone the job laid out. It is obvious that, at least in the smaller staffs, we do not have all of the competencies required for an important impact in the many program areas where we have opportunities and responsibilities. Yet, elsewhere in our universities and in other agencies, there are many of the competencies required. We cannot operate as hermits self-sufficient unto ourselves and ignoring other organizations around us. One challenge for the future is to develop procedures for more fully applying the resources of our universities and other agencies to our programs. Our organization can gain from such a development, and so can the others, as our competencies are brought to their programs. In this connection, we recognize that the Extension Service, as a part of the university, is inseparably identified with it, sharing in and contributing to the university's fortunes.

At the national level, an identification of other organizations with Extension will facilitate development in the States. "Rural Development" has provided a specific force in this direction. Since the beginning of rural development, interagency participation has been strongly encouraged.

I propose that it is not enough to ask others to help us. If such broad program efforts are to receive support and full cooperation, there must be partnership in planning, conducting, and responsibility, and in the glory that goes with success.

The Need for Specialization

The needs of extension clientele demand that we employ extension personnel with more specialized training and with more specialized assignments than we used in the past. In Massachusetts, we are moving as fast as we can to a system of regional agents and specialists. This combines several county staffs into one program organization. These regional agents will have specialized types of farming assignments and will be organized into teams, including specialists in economics, engineering, and perhaps in other disciplines. They will be oriented to the management decisions of the farm—each serving a type of farming. One will be an expert on managing dairy farms, another poultry farms, etc. These specialists will have far more training in management and marketing than has been traditional for county agents. All those to whom we have given assignments as regional agricultural specialists have, or are about to receive, the master's degree in economics.

Similarly, in the specialist staffs professional competency and speciali-

zation must be at a higher level than we have had in the past. To take an example: a specialist in retailing has as broad an area as a specialist in farming. If we are to have an impact on the retail food industry, our work has to be far more specialized, perhaps with specialists in financing, merchandising, personnel management, and other fields. Take a more familiar example: with regional poultry specialists the need at the college may be not merely for another poultry specialist, but for specialists in genetics, nutrition, management and other fields. An integration of research and extension functions with joint appointments is one way to achieve such specialization and a high level of competency. We have considerable integration in economics and I think we shall have more.

An obvious approach is to concentrate our efforts in only a part of our area of responsibility and provide a highly specialized staff in that field. At least in States with smaller staffs we must deliberately avoid trying to develop equal emphasis in all programs that readers of the Scope Report might suggest. We must carefully weigh our alternatives and concentrate our resources on a limited number of efforts carefully selected to maximize our impact. Economists can be of valuable assistance in helping extension administration with such decisions of resource use. However, there are limits to this approach, as too great a limitation on the scope of our work can severely limit accomplishment and opportunities for growth. We can become known as an organization of narrow interest and biased emphasis.

There is another approach to this problem, and it is particularly applicable to regions such as New England. This approach is to develop greater interstate, regional cooperation. Each State may provide specialists for others in areas where other States are not staffed. I recognize many limitations to this approach. In New England, however, we are making progress, and much more will come in the years ahead. This approach must provide real regional programs, not just token efforts. With such a procedure, each State can have a broader program than individual States can finance and simultaneously operate intensively in individual areas. As one example, I would like to see a single outlook program for New England. I am certain it would be better than any that the six States now provide. The cost would not be greater than the amount we now put into our feeble outlook programs.

Need for Integration

More specialization is not the complete answer to our special problem. While we need increasing specialization in our staffs, the need for people to understand situations in their totality is growing. Workers with ability to integrate knowledge from several specializations in the decision making process are needed. As we develop higher degrees of specialization within the staff, we must find effective ways of achieving this integration

to help people solve complex problems. This requires teamwork, and individual members of the team who can exert an integrating influence within the staff. Massachusetts' regional specialists are expected to have training and ability to perform this function, and we will look increasingly to economists to serve in this role on the college staff.

We are challenged to perform this important service in such a way that others accept and seek our contribution, rather than look upon us as passing judgment on the products of their ingenuity and industry. In our productions, like those on Broadway, success largely depends on those with active roles on the stage. An outstanding performer can often make an otherwise dull show a success, but each actor assumes some responsibility for its success or failure. The critic, however, plays a passive role, accepts no responsibility for the production, and rarely is given a part on the stage. The economist making his contribution cannot avoid being on the stage, taking responsibility as a member of the cast.

Extension's Problem-Solving Role

Various writers have pointed out that the responsibility of Extension Service is for educational work that is problem-solving in nature. This process is certainly familiar to all of you. I refer to the process by which we identify problems, refine knowledge of problems, develop hypotheses for problem solution, test possible solutions and, by demonstration and in other ways, encourage adoption of solutions. While this problem-solving emphasis is accepted by most extension workers, there are others who think our job is a limited educational process of formal teaching, bulletin writing, and information disseminating. They look upon extension workers as pedestrian laborers running back and forth across the yard carrying pails of water from the spring of knowledge to a thirsty herd. Indeed, this limited philosophy is encouraged by some who believe that all problem identification, hypothesis development, and testing, constitutes research, who imply that we differentiate in the application of our funds between research and Extension on the basis of steps in the problem-solving process.

I fully recognize that it is the responsibility of the administration in each State to determine the limits on the use of Extension and research funds and the means of developing coordination between Extension and research. I would propose that both services be considered problem-solving in nature, that emphasis on problem-solving is not the basis of differentiation, and that Extension's responsibility in educational work is to help individuals, firms, and groups identify, evaluate, and apply solutions to problems they face today and in the near future. As it does work in problem-solving, its basic orientation is toward the development of people and the development of action by people.

To do this kind of job, we must be engaged in the collection and analy-

sis of problem data, and we must involve the groups with which we work in this process so that we accomplish the program objective. Personnel at all levels need to place greater emphasis on working with the leadership among their clientele using this approach. This applies to economists as well as other members of the staff. With such an emphasis, Extension needs an infinite amount of basic research knowledge. Let us encourage research workers to greater progress in developing this point of view.

The problem-solving approach has proved effective with all classes of clientele—leading farmers, chain store executives, youth leaders, government officials—on a variety of problem types. Let us use this approach to get the impact on our society that we must have for the future. We might add that the ultimate test in much of our problem-solving work is an economic test. The need for economic tests of solution alternatives places responsibility on the economist. It provides for him an opportunity as part of the team on the stage. Specialists in other fields can learn to apply economic tests within their fields. They should be encouraged to do so without weakening their competencies in their primary field. Specialists in economics play a dominant role in applying the test of economics to problem-solving work throughout our programs.

A Dynamic Positive Emphasis

In the whole Scope effort, there is a dynamic and positive emphasis on educational work with problem solving objectives. It is an emphasis on development and growth, and on helping to develop a better world tomorrow. This emphasis is a refreshing and inspiring contrast to the suggestion from other quarters that agriculture is a declining industry, that agencies serving it must share in this decline, that we should be primarily concerned with downward adjustments. It is consistent with our responsibility to exert leadership in helping individuals, firms, and communities in developing their potential; applying ideas that can contribute to social and economic growth. The Land-Grant College and its Extension Service are recognized throughout the world for their success in providing development and growth. Pilgrims come from far and wide to see how they work and our missionaries go forth to spread the word. Let us continue to demonstrate the evangelism for the cause of growth and development at home that has been so valuable in the past.

Extension economists, in some cases, are calling the shots in this approach. Their role has been conspicuous in rural development. There is a challenge to economists to work more effectively in this kind of developmental problem solving approach, to shake off once and for all its reputation as the dismal science. Further development of such an orientation in economics will strengthen the Land-Grant College and facilitate the allocation of greater resources to economics.

Some Observations on Several Program Areas

I have not discussed the nine areas around which the Scope Report was built or the detailed implications for agricultural economics in each. A careful reading of the report indicates, however, that its framers expect program accomplishments that can be made only if the building blocks of economics are used liberally throughout the whole extension structure.

To build such a meaningful structure with vigor requires substantial resources. We may seriously question whether the support economics now receives is sufficient for the job. One of the great challenges to the administration is to develop the ability to shift the use of its resources as changes in the problems and needs arise.

As we work with more highly-trained farmers, operating larger, more specialized farms, closely coordinated with marketing and processing firms, we are challenged by them and the nature of their business decisions. This is a challenge of special significance to the economist. You are challenged to provide answers to the complex business decisions farm operators face and to do so at the time and with the precision required in an agriculture with small margin for error. There is a similar challenge in our work with processing, marketing, and supply firms. In a number of States there are outstanding examples of economists who are meeting these challenges—with specialization and a problem-solving approach. There are cases where extension economists work with management on high echelon decisions, using modern data processing methods with outstanding success. These and other new techniques of economic analysis will be adapted to extension programs. I would encourage more experimentation in this direction.

Of much public interest in recent years are the changes in the market structure. All are familiar with the literature describing these changes—referred to grossly as "The Imperfectly Competitive Society." You know of the court cases and Congressional hearings in which some phases of these changes have been aired, and the effects these changes are having on farmers, their cooperatives, and other business firms. Economists must take the lead in developing an understanding of these changes and of the imperfectly competitive society itself. We must give new energy toward helping people discover how to operate effectively and profitably in this kind of economy.

Our nation faces new decisions in the wise use and management of its land and water resources. Our rapidly expanding population, with expanding demands for water and land to produce a variety of services, is placing increased pressure on our land and water supply. The American people express concern for the many needs of future generations. Economists who can make important contributions in this field, working in close cooperation with a variety of other disciplines and agencies, will be in

greater demand and will help to build the strength of our Colleges of Agriculture for the future.

Earlier, I made passing reference to public affairs and community development work. I see in these areas the particular need for the economist as well as other social scientists. A public affairs emphasis should be carried by extension economists specializing in marketing, resource use, and other fields. Public and private decisions in this field cannot be reasonably separated. In public affairs work we must lead people to explore questions for public action.

Over the years, economists have made many outstanding contributions to the development of our agriculture and to the research, teaching, and Extension programs of our Land-Grant Colleges. You now exercise considerable initiative in the reorientation of our programs. Extension administrators look to you for future guidance and leadership.

DISCUSSION: IMPLICATIONS OF THE SCOPE EFFORT TO AGRICULTURAL ECONOMICS

GEORGE S. ABSHIER
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Discussion of Director Davis' paper will consist of three major parts: First, areas of general agreement; second, some areas of disagreement or criticism; and third, some additional ideas that might have been included in the subject.

Director Davis' observation that the "decisions concerning the allocation of resources within the total scope are at least as important as the scope effort," is of great significance and in my opinion will be a growing burden on the shoulders of extension administrators. Although it was obviously not the intent of the Scope authors to indicate any degree of priority or method of determining such, some type of formula or guide may be useful in the future.

I am in general agreement with Director Davis' principles upon which the analysis is based. However, I would question whether we are not developing increasing support from segments of society other than agriculture and the rural community. I certainly agree that it is difficult for the people to understand our operation or the way we handle some of the problems. Too many times it has been said that people have problems and colleges have departments.

I like the several types of approaches suggested by Director Davis in organizing to do the job of Extension and the emphasis he gives on increased demands for training and specialization. Of course, there are many other methods of organization or approach to the solution of prob-

lems but a listing of them would take much more time and space than was allocated to Director Davis.

I also wholeheartedly agree on his comparison of the responsibilities of Extension and research. Director Davis also mentioned briefly a few specific implications to economists for which there is no quarrel except that these mentioned are only a few of the many possibilities.

My areas of disagreement are more in the nature of degree than with actual statement or fact. Although it may seem to be a minor point, rather than put Extension in position of receiving the first shot of attack I would prefer to think of Extension as the front door and the picture window of the Land-Grant College. I believe that Extension and the Land-Grant College system have at least achieved some degree of recognition—they are certainly much more acceptable than they were a few years ago.

It is the responsibility of all extension personnel, in fact all educators, to maintain an unbiased approach to all ideas and stay clear of the destructive danger of repeating the complaints of others, complaints which normally reflect an unsound bias.

Director Davis indicates that the Scope effort comes at a rather unique time, when magazine editors and others are questioning the role of the College of Agriculture, when our agricultural economy and society are undergoing vast and rapid change, etc. I would simply ask the Director if there has ever been a time when things were radically otherwise or if he ever expects such a time when we will not be undergoing rapid change. I would further ask whether change is good or bad for Extension. Would we be so likely to be on our toes if we did not have someone looking over our shoulder occasionally?

Now I would raise some additional questions that I think deserve some consideration in a discussion of this topic. In my opinion, a close study of the several areas of program emphasis—particularly, a study of the areas of change so well pointed out in the Scope Report—indicate a much more responsible implication for agricultural economists than Director Davis indicates in his paper. Agricultural economists may not be directly concerned with all of these areas of emphasis; however, I believe economists should be working more and more with all disciplines, giving more guidance to research activities, and providing the tools and methods of analysis not only for allocation of educational resources but for the solution and analysis of problems.

In this connection I wonder if we have assumed some of our actual responsibilities away. The Scope effort itself says that Extension "joins with people in helping them to identify their needs, problems, and opportunities, to study their resources, to analyze alternative solutions, etc." Are we expecting too much of people to ask them to conduct research on themselves and come up with practical solutions? I do not

mean to imply that people should not be involved in looking at their own problems; what I am asking is, "Are we using this approach as a dodge to escape some of our difficult responsibilities?"

Both the Scope effort and Director Davis' comments are couched in terms of problems of the people. In fact, most of our extension programs deal with problems as they develop. Perhaps this is one of our shortcomings. We should not just be pushed along by the problems of the day, but should look to the development of programs that will help avoid some of the problems.

Finally, I think it should be pointed out that today's Scope Report will be as obsolete as some of the equipment in use at the time of Seaman A. Knapp's first demonstrations. We should not fight the necessity of changing the Scope Report when it comes. Rather, we should be in a position to take the leadership in shaping the new statement on Scope and responsibility as the necessity will continually arise.

CONTRIBUTIONS OF AGRICULTURAL ECONOMISTS TO THE SCOPE EFFORT

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EACH OF THE three major statements developed in the last 15 years as guidelines for extension work have had special significance in the shaping of extension programs as we know them today. Each of the first two[1,2] was directed toward the circumstances of its day and served as a prologue for the third and more recent. While comparisons are not intended here, the document entitled *A Statement of Scope and Responsibility—The Cooperative Extension Service Today,* surely carries strong economic implications. These have long-range importance for effective extension work pertinent to needs of the day. It is appropriate that agricultural economists, especially those engaged in extension work, take special cognizance of the contributions they can make in supporting and implementing the programs suggested by the Scope Report.

As the extension administrator seeks to assist his staff reach high levels of achievement and allocates extension resources accordingly he knows program efforts must be cast in a realistic framework with proper weight given to economic considerations. He looks to agricultural economists on the extension staff to help provide this program balance. At the same time, the administrator is concerned with the welding together of the contributions from all disciplines. It is from this viewpoint of an extension administrator that the argument of this essay is presented.

The discerning extension worker will continue to reinterpret the Scope Report in the light of modifications in emphasis which may be required by changing needs of the day. The current concern regarding adjustments in agriculture is a significant development of this sort and requires the attention of many disciplines. It is significant that extension programs are becoming increasingly problem-oriented and less circumscribed by single disciplines than in earlier years. This would appear to be a natural development if the implications of long-time program projection are taken seriously.

A study of the Scope Report reveals a deliberate cross-disciplinary structuring of the areas of program emphasis so that problems are considered and dealt with just as the individual person, family, firm, or community or other group must do. The recently proposed grouping of ex-

[1] *Report of Committee on the Scope of Extension's Educational Responsibilities.* Fed. Ext. Serv., 1946.

[2] *Joint Committee Report on Extension Programs, Policies and Goals,* USDA and Assn. of Land-Grant Colleges and Universities. U. S. GPO, 1948.

tension activities into five major projects for program purposes is a logical further manifestation of the thinking along this line. The point is that this surmounting of discipline lines or boundaries is fast becoming fact —both in theory and practice. It is effective and makes sense to extension clientele. Moreover, this same development is increasingly observable in the conduct of research.

Without intent to be exhaustive, possible contributions by economists will be reviewed briefly by areas of program emphasis as outlined in the Scope Report, but regrouped in line with the five major program projects now being instituted in many States. While no order of importance is implied, it is readily apparent that the number of possible contributions by economists is significantly greater in some areas than in others. It is obvious that relative emphasis, priorities for work, and choice of methodology, will vary by State and by county.

The first of these groupings is "Agricultural Production, Management, and Natural Resource Development." The business of agriculture must be concerned about production. This must be efficient production in the interest of both the producer and the economy as a whole. It is not surprising that "Efficiency in Agricultural Production" should have been outlined in the Scope Report as a major area of extension education emphasis. The sequel to the Scope Report, *A Guide to Extension Programs for the Future,* elaborates somewhat on the nature of problems on which extension work may be focussed with reference to production efficiency in agriculture as follows: "1. Surpluses continue to create difficulties; 2. Marketing methods and structures are changing at an increasing pace; 3. Consumer preferences are shifting; 4. Competition is arising from other segments of the economy for land, labor and management; 5. Capitalization requirements are higher; 6. Adjustments are becoming necessary in farm unit size and in such organizational matters as degree of specialization; 7. Government programs pose special requirements; 8. Opportunities and needs for off-the-farm employment are growing; 9. Problems are arising in fitting production into a pattern of vertical integration; 10. Specialized industries are being created to provide many of the services formerly performed by farmers themselves."[3]

Each of these situations is familiar to the agricultural economists with specializations in management, outlook, credit, marketing, demand, policy and the like. It should be abundantly clear that the needs and opportunities for contributions by these specialists in this area of efficient agricultural production are many. Close collaboration is imperative between economists and their colleagues in other disciplines.

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[3] *A Guide to Extension Programs for the Future.* Agr. Ext. Serv., N.C. State College for the various Agr. Ext. Serv. and the USDA, 1959.

Economists have traditionally been concerned with resource use. "Conservation, Wise Use and Development of Natural Resources" as an area of program emphasis surely offers significant opportunities for attention by agricultural economists. The related areas of "Public Affairs" and "Community Improvement and Resource Development" will be discussed later. Suffice to say here that problems concerning natural resources often become questions of public policy and community action. In these, the agricultural economist is eminently well qualified to aid in efforts toward wise appraisal of the problems and alternative solutions.

Extension objectives in this area of program emphasis suggest specific considerations on which economists can and will bring their resources to bear. These objectives as stated in the Guide are to help people: "1. Identify natural resources; 2. Understand their distribution and extent; 3. Appreciate their importance—both socially and economically—to themselves, the country and to posterity; 4. Understand the interrelationship of natural resources; 5. Recognize problems of resource management; 6. Become aware of what is being done in resource conservation and the continuing nature of this job; 7. Understand individual roles in the conservation job; 8. Become skilled in individual resource management; and 9. Organize for mutual resource management."[4]

Examination of these objectives suggests that agricultural economists are needed to assist in gathering and interpreting data pertinent to the realization of each objective. Aid will also be required in appraising, together with specialists in natural sciences, the probable consequences of various courses of action.

Every person and group in our society bears an inescapable responsibility for managerial decisions of some order or kind. Skill in the process of decision-making and problem-solving can be taught and learned and thus the quality of such decisions improved. The task in the area of "Management on the Farm" is to aid farm operators to become more skilled in the management of the farm or ranch has a unit.

Agricultural economists in this management field are providing leadership in use of the farm and home development method or so-called "unit" approach to management problems of farm and home. This is an opportunity to teach management principles and the decision-making, problem-solving processes. One impact of this approach has been wider use and appreciation, by extension agents and specialists in other fields, of the management process as a base for applying a wide variety of subject matter. Perhaps more than any other single factor, farm and home development has enhanced cross-disciplinary effort in extension programs in the production, management and natural resource use area. There are

[4] *Ibid.*, p. 15.

further dividends to be reaped in this respect by both the extension staff and its clientele.

One further word on management: The management area touches most phases of extension and thus is one in which every extension worker is involved and can make a contribution. As a result of his special training the agricultural economist in farm management can lead and aid his extension colleagues to greater appreciation for and consideration of management principles in his or her own teaching.

The structuring of the proposed extension project titled "Agricultural Production, Management and Natural Resource Development" embraces what is suggested in the foregoing and more. Together with the Scope Report and the Guide this structuring should enhance the framework for coordinate effort by economists and the other extension specialists.

In this whole complex of Agricultural Production, Management and Natural Resource Development, five aspects appear to largely encompass the agricultural economists' role and area of contribution:

1. Application of technology must take place in a framework of economic principles if efficient production of food and fiber is to be achieved consistently.

2. Acquisition of sufficient resources and efficient use of them is important to the development of an adequate and successful farm business.

3. The impact of conservation of both natural and human resources is significant to the farm business and farm operator as well as to society.

4. With skilled management a not-too-plentiful resource, the improvement of management competence on the farm holds a high priority.

5. A knowledge of the outlook for products to be bought and sold is sought by more and more farmers and is of importance to them in their management decisions.

The role of the agricultural economist with reference to the program area of "Marketing, Distribution, and Utilization of Farm Products" should require little elaboration for a group of economists. In the Guide, there are set forth three broad objectives of extension programs in this area: "To reduce the cost of marketing farm products; to expand the market for farm products; and to help people understand the marketing system." The competence of the agricultural economist trained in marketing lies directly in this field. He must be careful, however, not to regard this as his own private province but rather seek collaboration with other disciplines. The functions of marketing include assembly of raw products, grading, transporting, processing, packaging, storing, distribution, and merchandising, as well as specifically economic functions such as exchange of ownership, pricing, and financing. The former of these functions embody much technology which other specialists can best provide.

Animal husbandmen, dairymen, horticulturists, agronomists, engineers, foresters, and food technologists are but a few of the specialists commonly found on extension staffs who also have a role to play in addressing marketing problems.

It has been estimated that beyond the part that farmers and consumers play, over one million firms, employing 10 million workers and adding $60 billion of services, are involved in marketing service activities.[5] The point is that the magnitude of the task in bringing to this clientele the results of expanded marketing research is a major challenge to the Extension Service and to the agricultural marketing economist.

In the field of utilization, only modest extension programs have thus far been undertaken. This special area requires the participation of economists just as urgently as does that of agricultural production. When new products or new and improved practices are proposed the economist can aid with consideration of such questions as: Will it pay? And, if so, under what conditions?

In brief, agricultural economists can contribute to extension programs in marketing in at least five ways: 1. Assist in improving the efficiency in which the functions of marketing are performed—assembly, grading, processing, distributing and the others; 2. Foster expansion of the market for farm products through information on consumption patterns, on application of research on new or improved products, and on market analysis, for example; 3. Provide assistance on the economic aspects and consequences of improved quality and of quality controls; 4. Provide information and assistance useful in the adjusting of market organization, institutions and facilities; 5. Aid processors and others in appraising the economic aspects in adopting improved utilization technology.

Agricultural economists must surely have an appreciation for the usefulness of economic subject matter and management skills in their own homes. The dynamics of both our society and economy have strong impact on family living and place before families many complex problems and choices. An understanding of trends and adjustments and of the decision-making process has much to offer in the area of family living. While this has been touched upon in a foregoing section concerning farm and home development, it is re-emphasized here to underscore what the writer believes is a serious gap in extension home economics programs. Much stronger emphasis on the economic aspects of extension home economics programs appears to be in order. Some reluctance on the part of extension agents to actively engage in this field has been observed. These agents feel inadequately trained and hence on shaky ground in this

[5] *Ibid.*, p. 9.

area. Perhaps this can be traced to insufficient and inadequate research and some undergraduate curriculum gaps in the economics of family living in some institutions.

The foregoing suggests that agricultural economists might lend their support more vigorously to appropriate undergraduate and in-service training programs. Both resident staff and extension specialists can be helpful. The possibilities are many. They lie in such aspects of family living as family economics, home management, buying practices, nutrition and food, housing, and problems of low income. The management of family resources and the interrelationship of farm and home in an economic framework offer a rich field for effective teaching. In family economics alone, there are great needs for educational work in estate planning, insurance, credit and family finance, family business procedures and the like. This brief sketch of possibilities touches but lightly this intriguing opportunity to strengthen extension programs in family living.

In the area of Youth Development, the possible contributions by agricultural economists may be less apparent than in some other fields. The opportunities hinge on the concept that may be held of youth development work. The Scope Report suggests that the age groups encompassed by this area of emphasis include the 4-H span of ages 10 to 20, plus young people whose secondary level education has been completed and who are seeking aid on a variety of problems, and young married couples concerned with establishing a home and an income.

Many States are now turning to a graded approach in 4-H club work. In this the older members are provided with more advanced projects and experiences. A good number of these lend themselves to the teaching of economic principles. The extension economist through consultation with the 4-H staff in his State can influence the degree to which such enrichment of advanced projects will come about. Orientation to and some experience with problem solving and managerial principles can be provided the older 4-H member in enlarged, advanced projects designed with this objective in mind. The recent introduction of the Town and Country Business project in work with these young people is illustrative of what can be done concerning off-farm opportunities. It has career exploration potential in the field of agri-business and at the same time can provide a substantial beginning to an understanding of the marketing process. Increasingly, extension must take up the challenge of helping these older 4-H and other youth explore the vocational opportunities for them in the nonfarming phase of agriculture.

The problems of young adults in the process of establishing homes or getting started in farming present opportunities for the agricultural economist which are as broad and as varied as for work with older adults.

The difference is that here the opportunities reflect characteristics peculiar to the problems of young couples. The need for imaginative and significant effort in this area is great. Agricultural economists are especially well qualified to lead in programs designed to aid young couples in appraising farming opportunities, in analyzing the resources required, and in surveying and pursuing sources of credit.

"Community and Public Affairs" as an area of program emphasis is replete with opportunities for agricultural economists. Program success in Rural Development, or Rural Areas Development as it is now termed, particularly requires economists' participation and contributions. Basically any consideration of this approach in a community or area of a State calls for certain amounts of economic and social analysis by local committees. In this, these committees will need aid in gathering, sifting and analyzing appropriate information. Agricultural economists and rural sociologists must team up to aid extension agents and local committees either in carrying out this process or in learning and using the techniques required—or perhaps both.

Public Affairs, as defined in the Scope Report and the subsequent Guide, is a much broader program concept than some extension work in this area formerly encompassed. Educational work may deal with a great variety of concerns on the part of groups of people. The primary goal for extension in this area is to provide the kind of educational program which will enable groups and the individuals within them to make intelligent and informed analyses and judgments of public issues.

Some specific categories of effort in this very broad field of Community and Public Affairs stand out for attention by agricultural economists:

1. Communities and areas are anxious for help in understanding and planning for adequate community services.

2. To be successful development of resources in communities and areas must rest on thorough economic and social analysis and be soundly organized.

3. Improved general understanding of the interdependence of agriculture and the rest of the economy is of special significance. Accompanying this must be broader understanding of agriculture's problems in adjusting to changing economic conditions.

4. There is widespread need for better understanding of the general economy, of the importance and nature of foreign trade and foreign trade policy, of the nature of inflation, and of interregional competition in and out of agriculture.

5. Better understanding of alternative solutions of the policy issues of the day and their consequences can be appreciably enhanced.

The Scope Report and the Guide place significant emphasis on leadership development. The process of extension education in any area of

emphasis should inevitably enhance the competency of individuals who participate. This holds for those who are or those who may become leaders. The methods used in extension work often provide experience vehicles for present and potential or future leaders. For the most part much of Extension's contribution to leadership development is incidental to the furthering of programs focussed on specific problems. The opportunity for agricultural economists would appear to be one of fostering a more thorough understanding of economic principles on the part of those persons who may at some time emerge as leaders.

In the last decade State Extension Services have placed special emphasis on a program development technique or process known as program projection or long-time program planning. In this process programing is based on fairly intensive studies of local problems by county committees followed by some indication of program priorities. To do this well, both the county extension agents and local committees require pertinent economic data among other information. This needs to be organized and analyzed in systematic fashion using appropriate tools of analysis. In this process agricultural economists can serve effectively and are needed as resource persons to agent supervisors, extension agents and local committees.

The possibilities for contributions by agricultural economists to the areas of emphasis as outlined in the Scope Report, regardless of how they may be grouped for operational purposes, are almost without limit. This is to be expected in that economic considerations play such an important part in so much of the affairs of man. Opportunities are many. The field is wide open for occupancy.

DISCUSSION: CONTRIBUTIONS OF AGRICULTURAL ECONOMISTS TO THE SCOPE EFFORT

T. E. Atkinson
University of Arkansas

Challenges, as well, perhaps, as commendations comprised Director Abraham's paper dealing with the contributions of agricultural economists to the Scope effort. He pointed out that ". . . economic considerations play such an important part in so much of the affairs of man" that the possibilities of economists are "almost without limit."

I would have been encouraged had more been said about past efforts of economists as a contribution to the Scope Report. But we desire to be forward-looking and perhaps it is well that the Director circumscribed his paper with reference to "possible contributions by economists."

Mr. Abraham did an excellent job of showing that economists have an

important role in the total extension program. He challenged economists to help get balance in extension programs; to increase cross-disciplinary efforts and collaboration; to see that economic principles are applied in the application of new technology; to reduce marketing costs; to put economics into home economics programs, especially by filling gaps in undergraduate curricula; to have more economics in youth education and other leadership development work; and to gather, analyze, and interpret information for many groups and uses. It is a large order, and yet we have been working toward most of these objectives for a long time. It is still not clear whether economists can make further contributions, and how. It is like saying we need to help agriculture become a full partner in economic growth, yet not slow the pace in the nonagricultural sector.

The author was not specific about the number of resources needed to perform the agricultural economics role, or to what extent new methods will need to be employed in performing it.

One part of the paper appears to be a sort of plea for support of Scope and a consolidation of extension program projects. I was never quite sure how much he was emphasizing new programs, or merely new methods and groupings to put a new dress on an old program. For example, much mention was made of cross-disciplinary cooperation but emphasis was always on agricultural disciplines. There was little indication that our concept of programs should be broad enough to encompass such disciplines as political science, philosophy, and others that are not normally a part of an agricultural curriculum or research program.

I do not believe Extension is any more problem-oriented now than it was in its inception, but the problems are now different. Most present-day problems have a physical, economic, and social aspect.

But in grouping disciplines for convenience in attacking problems, let us recognize that a satisfactory solution for one decision-making unit (family, firm, community, or society) may be in conflict with goals of another decision-making unit with which Extension is concerned.[1]

The paper, it seems to me, mirrors the situation faced by extension administrators in trying to serve a changing clientele in a new social and economic setting, equally as well as it tells what economists can do to assist. It is obvious that we have a long way to go in charting what and how to do those things that economists can do to contribute toward the Scope effort.

Scope apparently represents a willingness—even a determination—to modify program content and operations in the light of new information or changed situations. This is good; but, in my opinion, administrators must take the lead in achieving program balance. They must determine

[1] Ratchford, C. B., "Achieving an Integrated Program," *J. Farm Econ.*, Dec. 1960, p. 1142.

whether too few of our resources are being devoted to new aspects of the total program or to disciplines that have grown in importance.

Important and helpful as are the nine areas of Scope, they more nearly represent the well-marked courses on extension's highway map than they indicate destinations for either Extension or the people whom they serve.

I believe a lot of educational effort is involved in helping all with whom we work to determine *objectives*, which are the real destinations of the various roads outlined in Scope. If this is done there is a possibility that agricultural economists will be among those in the best position to assist with this type of education.

THE SCOPE EFFORT AS VIEWED BY AN AGRICULTURAL ECONOMIST

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"COMFORT the afflicted and afflict the comfortable!" This was the charge recently given to the Illinois Cooperative Extension Service staff by a wise old friend. I suspect that similar motives on the part of your program committee partially explains why I am presenting this paper. I assure them if this was an objective, up to now the project has been highly successful. Unfortunately for you, however, the time has come when you too must be afflicted.

The thesis, or more accurately the hypothesis, of this paper is that the Scope effort has been an effective device for stimulating worker self-analysis and cooperation, but it is hardly the beginning of the very important task of setting the goals and the metes and bounds of Cooperative Extension Service work. Rather than being "national blue prints," as some claim, the Scope Reports should be viewed as preliminary architectural sketches of the future edifice.

To avoid waste of effort and frustration on the part of workers some basic decisions are needed. There are contradictory ideas about how much remodeling is needed on this structure, its final appearance, its future use, what new materials will be needed to complete the job, and where we will find them. Experienced as we are, we need to finish the working drawings before we tear out the old structure. I hope my reasons for these statements will become apparent as I give my views on the Scope effort, its need, value, and limitations.

The Need

New and rapid changes in American agriculture, the decline in the number of farmers, and growth of Government programs and agencies have been cited as the justification for the Scope effort. To me there are even more compelling reasons for inventory taking.

First, every organization and particularly one supported with public funds has a responsibility to critically appraise its operations and goals. To paraphrase K. H. Galbraith's comments on society, ". . . Such a task is second in importance only to that of insuring survival."

Second, the nebulous nature of informal adult education, its history in the United States and elsewhere, and the signal accomplishments of the Cooperative Extension Service should cause professional people continuously to study and record the lessons of their experience in this unusual

undertaking. Professional educators refer to the Cooperative Extension Service as "one of the largest and most spectacularly successful educational ventures in American history," but documented analytical studies are scarce. As Lyman Bryson intimated, we practitioners cannot permit philosophizing to interfere with our work, rather, we are more likely to be so preoccupied with the "urgent" that we do not consider the "important."

We are now in the rather contradictory situation where the future of the Cooperative Extension Service is being questioned while at the same time there is an increasing interest in adult education. Moreover, some of the planned expansion in education for farm people is by other arms of the Government and with the USDA and the Land-Grant Universities providing the subject matter. Some examples are the activities of the Soil Conservation Service, State Departments of Agriculture, and the Vocational Agricultural Service.

In my judgment, the adult programs of the Vocational Agriculture Service, in particular, merit attention. Considering the financial plight of most rural school districts, there must be a felt need for education of this kind if adult programs are the reason for keeping and expanding vocational agriculture. Of course one might question whether both the Cooperative Extension Service and the adult vocational agriculture programs will finally prove to be flukes in our historical experience with adult education. Is it possible that they were only the product of agricultural fundamentalism and emergency situations and will finally parallel the experience of the Indian agencies?

Dr. Paul Miller has named two dominant chapters in Extension's history; the first was that of the itinerant philosopher and demonstrator, and the second was the agricultural agency organizer and promoter, or as he puts it, "organizational custodianship."[1] These are apt labels but throughout Extension's history emergencies have held the spotlight much of the time.

We know that the Texas cotton boll weevil outbreak in 1903, the need for food in World Wars I and II, and the great depression of the 1930's stimulated and shaped the growth of Extension. But, obviously, we do not know: What Extension would have been without emergency situations. Without them would Extension have failed to generate public support, or would Extension with the help of the USDA and the State Universities have sparked even greater appreciation and support for adult education? Even now one educator, Dr. Thurman White, Dean of Extension, University of Oklahoma, is asking, "Is the free scholar teacher of adults worth his salt, or must he teach the truth as people want it taught?"

[1] Miller, Paul A., "Adjustment Needed in Extension Thinking and Organization," *J. Farm Econ.*, Vol. XLI, No. 5, Dec. 1959.

I think you will agree that in the Cooperative Extension Service we have not always been "free scholars," and are not proof that adult education can survive on this basis.

Extension also needs answers to questions concerning our "itinerant philosopher growth era." Was Extension's success due to the astuteness of early extension workers, to their ability to select subject matter and to develop close ties with families through youth work, and to their adroitness in dealing with the general public? Or, as some have implied, was our early success due to the lack of competition? We can only surmise answers to these questions. We know that early extension workers quickly discovered that farm people of their day wanted "practical and useful" information.

As John Milton Mackie observed at St. Louis in 1856, "The genius of this country is necessarily mechanical . . . our education is no genial culture of letters but simply learning the use of tools."[2] Mr. Mackie held that Americans' belief in the cash value of personal efficiency would prevent interest in broader education in the foreseeable future, and that rural people would be slower to change than others.

In the light of experience in adult education one does not question Mr. Mackie nor early extension workers. What one might question is whether along with their limited training as educators preoccupation with emergencies and day-to-day duties prevented leaders in the Cooperative Extension Service from visualizing and working toward a full-fledged adult educational program at the county, State, and national levels.

There is evidence that many of our leading farm people have often been ahead of Extension in breadth and depth of extension education. I refer in part to lack of effective work in the social sciences and to extension workers' preoccupation with activities which perfect things rather than people. The stress by both Extension and Vocational Agriculture on the art of showing and judging animals and crops, and on the manipulative skills has often come about at the price of minimizing subject matter designed to develop the perceptive skills.

The consequence of this imbalance of emphasis is far-reaching. It permeates the course offering and quality of academic achievement throughout our rural educational institutions, beginning with grade school and running through college. And more to the point of this paper, it has unquestionably influenced rural people's attitude towards continuing adult education in those subject matter areas that develop the individual's capacity to learn, his adaptability to new situations, and his contributions to citizenship.

It may be only my vintage viewpoint, but I believe that our older genera-

[2] From *In Quest of Knowledge*, Ch. 16, C. H. Gratton, Associated Press, New York, N.Y.

tion of extension workers did more than present-day workers to encourage self-improvement through education. Perhaps this could be expected, because education was the principal job of early extension agents, and as John Gardiner stated, the job of educators is to create a desire for continuous learning, i.e., "a conception of perpetual self-discovery."[3] He also states that "the talents that flower in a society are the kinds that are valued in the society."[4] Perhaps we in Extension should ask ourselves: Are we nurturing those talents in our clientele, both youth and adults, which will induce perpetual self-analysis and self-improvement through learning? More bluntly, have extension workers conditioned farm people to expect personal service and programs rather than education?

I am disturbed with the statements that Extension's major contribution has been to accelerate economic growth. This may be true, but if so it is an indictment of Extension as an educational institution. Our major contribution should be in developing people, to help them set high standards of performance, to set goals of all-around excellence, and to help them attain these goals. As our former Illinois Leader of Home Economics Extension, Kathryn Van Aken Burns, puts it, "Our job as educators is threefold: . . . To fire the imagination, to broaden the knowledge and to stimulate action."

I should like to conclude my reflections on "what might have been" in Extension with a few remarks on organizational structure. Extension has not reached its potential as an adult educational institution for rural people partly because our goals for an organizational structure were too limited.

With few exceptions, the typical State organizational goal has appeared to be a farm and home demonstration agent for each county with an occasional assistant for youth work and a small service crew of specialists and trouble shooters at the State office. We have operated under an even more restrictive growth policy at the Washington level. In essence, we have attempted to keep up with a modern agriculture while we used a 1914 vehicle.

Visualize with me if you will the Extension of today and the plans for tomorrow, if in approaching its fiftieth anniversary, the Cooperative Extension Service had matured into an institution capable of providing rural people with a thorough, well-rounded program in adult education. Assume that the counties were sufficiently staffed with competent educators to teach short courses in all subject-matter fields of agriculture and home economics, to broaden youth programs, to lead in community development programs, and to expedite crash programs originating from the

[3] Gardiner, John W., *Excellence*, p. 136, Harper and Bros., New York, N.Y.
[4] *Ibid.*, p. 101.

State office and Washington. It appears that Extension has and is operating as if this assumed structure were a reality. Without question Extension is long overdue a thorough audit of its assets and liabilities, and the development of long-range plans. The question is: Does Scope fulfill the need?

What Scope Has Done

Others on this program are in a much better position to judge the short-run accomplishments of Scope. Illinois was slower than some States in beginning its activities, and to my knowledge, no benchmarks were set from which to judge accomplishments.

The Statement of Scope and Responsibility was presented to central office and area conferences soon after its publication. State conference programs in 1959 and 1960 reflected Scope's influence. Later the Guide report was taken to county personnel and advisory councils and became the basis for planning the 1960 and 1961 county programs.

At the State level, our 1961-62 plans of work were developed on the basis of the nine program areas. This experience was frustrating, but helpful, and may have demonstrational value. In contrast to some of you, the Illinois central office staff had spent little time in an over-all appraisal of the Scope reports until a 3-day seminar in November 1960. Afterwards, committees and subcommittees met to delineate important problem areas and to evolve joint programs. Although our staff was somewhat dazed by events and uncertain of the outcome, the attitude was excellent. This may have been due in part to the rapidity with which the needle was injected by a new associate director.

Some surface results of the Scope effort in Illinois, and I suspect elsewhere, are these.

1. Scope has caused workers at all levels, and in varying degrees, to make a self-analysis of their work, their capabilities, and their plans for the future. To date I suspect this is the greatest benefit.

2. Scope has stimulated integrated efforts of extension specialists on current problems. For example, several departments at the University of Illinois are cooperating on a program concerning the production and use of roughage on Illinois farms. Efforts of this kind are not new, but Scope gives further encouragement to coordination.

3. Scope has helped to legitimize the economist's and sociologist's role in broad programs which other subject-matter specialists may originate. Economists have frequently been resented as obstructionists or referees in projects involving the physical sciences. The Guide report and our seminars helped to put the job of the social scientist in its proper perspective. For this, we economists should express our thanks.

4. Scope has caused our clientele and our friends to think more criti-

cally about Extension's role as a public institution, its strength, its weaknesses, and its contributions. We trust that outside evaluation will not cause Extension to suffer the fate of Socrates, but whatever the future holds, we as educators and public servants in a democracy must admit that public scrutiny is healthy.

5. Scope has strengthened the leadership role of extension administrators. The ship, or perhaps more accurately the ships, give the appearance of having rudders and captains. I believe that due to the way the reports were developed, to the seminars and activities which followed and, above all, to the administrative follow-through, the Scope effort is having greater impact than previous self-appraisal programs.

The basic ideas in the Scope Reports are not greatly different from the 1948 Joint Committee Report of Extension Programs, Policies, and Goals, which gave more attention to the legal and organizational aspects of Extension, to agency relationships, and to financing. However, many topics in the joint report are also in the Scope Reports. Developing leadership, youth work, credit, marketing, conservation of resources, farm and home planning, community problems, the home, responsibility to nonfarm groups, the science of Government, esthetic and cultural growth, training and professional status of extension workers, and objectives and Scope are all there.

The 1948 Report was not without some rather specific admonitions and recommendations which merit thought. For example, in the section on Scope and Objectives we read: ". . . That danger is that extension workers may tend to confuse immediate and rather short-run aims and accomplishments (improved practices and increased income) with the ultimate and more important over-all objective (educating people to help themselves)."[5] In another place, "Extension's assistance must therefore be geared to problems which people recognize and to the discovery of unappreciated needs, or it will do no educational work at all."[6] Then in the section on Teaching Methods and Procedures, is found this familiar statement, "Extension education is not an academic exercise but is education for use now."[7]

You will recall that farm and home planning was not overlooked by the joint committee. In their section on Need for Additional Resources, the committee writes, "Experiments during the past decade with educational programs directed to the development of individual farm and home plans, have, to date, been most productive. . . . However, such programs require intensive effort on the part of extension workers."[8] Later the com-

[5] Joint Committee Report on Extension Programs, Policies, and Goals, p. 7, USDA and Assn. of Land-Grant Colleges and Univs., Washington, D.C., 1948.
[6] *Ibid.*, p. 8.
[7] *Ibid.*, p. 33.
[8] *Ibid.*, p. 55.

mittee expressed doubts as to whether Extension should launch this "huge undertaking." Vacillation was rampant here!

One last significant quote from this earlier extension audit in their concluding thought on extension financing was ". . . it is apparent that Extension in the future must either so diffuse its energies as to lessen materially its total effectiveness or be provided with additional financing commensurate with the demand for its services."[9] What a prophetic statement!

To summarize, Scope's contributions to date are improved morale, better integration of the efforts of subject-matter personnel, and a greater desire for individual growth and self-improvement. Whether these specific gains will be temporary or permanent, and whether the Scope effort will be more valuable than the Joint Committee Report, depends largely on extension administration.

Limitations of Scope

I shall mention what I consider to be minor weaknesses of the Scope effort and then concentrate on its major limitation.

Integration of staff efforts along the lines of the nine program areas does not necessarily provide an atmosphere conducive to integrated efforts of staff members. First plans of work and annual reports on a program area basis tend to obscure individual performance of specialists. For example, the marketing economists have many more activities with the production and functional specialist than with other marketing economists. As we marketing economists attempted to prepare our plan of work we resorted to generalizations about problems, objectives, and plans. Measurements of results via annual reports will be difficult because benchmarks and objectives are general. Our first attempt at this coordinated marketing plan of work gave the appearance of much greater coordination than we could devise and at the same time carry out in our respective assignments. Perhaps experience and experimentation will correct this weakness.

But obscuring personal achievements of subject-matter specialists and others should not be taken lightly. Administration can partly overcome this problem by careful and accurate evaluation of each worker's accomplishments; but administrators must face the fact that personal recognition for ideas and accomplishments is an important remuneration to educators.

My major criticism of the Scope effort is that to date I see no real evidence that Extension is taking seriously the statement of need as expressed in the "conclusion" section of the Statement of Scope and Responsibility.

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[9] *Ibid.*, p. 55.

> Extension needs today . . . perhaps more than ever before . . . to define and to agree on a hard core of its educational responsibilities that has fairly universal application. It needs to agree on the major elements comprising that hard core . . . and it needs to dedicate itself firmly, consciously, and aggressively to conducting effective educational efforts with respect thereto.

This was a most encouraging statement. But encouragement turned into discouragement when I pursued the Guide report and reflected upon recent developments. I have a very uncertain feeling about what is meant by a "hard core" of educational responsibilities. The clientele is unlimited, except by the boundaries of the United States, and there are those who suggest that we must expand to an international organization. The subject matter extends well beyond the research in agriculture and home economics at the Land-Grant Universities and the USDA. All of this can be justified, I presume, if one assumes Extension will do educational work in any one of the broad problem areas such as public affairs, community improvement and resource development, and marketing, distribution and utilization of farm products. But once the Cooperative Extension Service departs from subject matter in agriculture and home economics, where are the boundaries? I see none except limitations imposed by lack of public funds.

An illustration of this point is the evaluation of work in extension marketing. There are sound reasons for the Cooperative Extension Service to do educational work with firms which assemble, process, and distribute farm products. An educator who hopes to teach farmers how to use markets wisely and how to judge their efficiency must know about those markets. This leads to first-hand information of marketing problems and into attempts to correct them. But to correct market problems the educator must have the cooperation of the firms affected, and management will cooperate only if it is in their self-interest. Thus the educator who began his project to help farmers may find himself working to secure direct benefits to marketing firms. This is the route through which most extension marketing programs in Illinois and elsewhere had traveled before the 1946 Agricultural Marketing Act. We had been over this route for 20 to 30 years and had developed enough knowledge to command respect from both farmers and the marketing agencies with whom we worked. Also, we had developed some guidelines on how to maximize the use of our scarce resources.

The Agricultural Marketing Act changed the old pattern and greatly stepped up accomplishments. But it did something more. Because of the need to spend funds, and because of a different objective, i.e., the prevention of farm surpluses through the expansion of markets, Extension re-oriented its views regarding its responsibilities in marketing.

I have no quarrel with what has been done if it is viewed as another emergency program from which we can salvage some gains in a solid

educational effort. My quarrel is with those who claim we know where we are going, that we have "a hard core of educational responsibility," and a definite conception of our boundaries. I cannot see that the Scope Reports have drawn boundary lines. Rather they have attempted to legitimize limitless boundaries both for subject matter and clientele. Marketing can again be used to illustrate this point. In my State we have asked ourselves: What do we do for farm supply firms? We have some research on the commercial feed business which could be supplemented with knowlege of agricultural trends and general business management to begin an extension program. But after this, what do we do, and what about other supply firms? Distributors and processors of petroleum, plant foods, and insecticides, machinery manufacturers and distributors, and lumber dealers have problems too, and would welcome help.

I am not hesitant about working with business firms, large or small, but I offer two guidelines:

First, that we not send our scouting party (Extension) too far ahead of our troops (research). We should regularly remind ourselves that agricultural research in the USDA and colleges preceded the Cooperative Extension Service by 25 years.

Second, and more important, that we do not rob our program with rural people in order to expand to others. I readily admit that agriculture means more than farming and that Extension can find a clientele in many places provided its staff possesses the talent and resource information to be helpful. But I not only believe that our prime obligation is to farm people, I am also convinced that this is where we will continue to receive the heartiest welcome and the greatest satisfaction. I hope my suspicions are unfounded, but some proposals for expanding Extension into "related agricultural fields" smacks of an attempt to "affiliate the old family with new dollars."

Educators and Administrators

Another and even more important need which the Scope effort has not met is to answer the old question of whether the Cooperative Extension Service is to be an action agency or an educational institution. The reports are replete with assertions that Extension's job is education but there is much wavering and some outright fence jumping. In the Joint Committee Report it was "education for use"; in Scope, "education for action." More recently Dr. E. T. York, Jr., administrator, Federal Extension Service, stated, "It seems to me that the county agent will more and more have to assume the role of a coordinator, organizer, and expeditor."[10]

In the previous paragraph of Dr. York's address, he had cited the need

[10] "New Trends in Extension Work," address by Dr. E. T. York, Jr., before a meeting of the American Agricultural Assn., April 27, 1961.

for staff competency in technical subject matter, so he was not suggesting that Extension abdicate the field of education in agriculture. However, to a follower and worker his statements are perplexing. Is it assumed that Extension will soon have enough county personnel to have qualified educators and an administrator to serve other agencies? This would be an ideal situation, but at present no Illinois county has a staff large enough for the county agent to be an efficient administrator or a well-informed educator in all the areas of responsibility assigned to him.

An alternative to an enlarged county staff may be area educational centers staffed with competent technicians in all phases of agriculture. This approach has much merit, but I have trouble reconciling it with farmers' response to personal contact and to the success of Vocational Agriculture with community adult classes.

A third alternative is for Extension to lay aside its robes and attempt to become an action agency. I do not visualize how this could be accomplished nor what real job Extension would have. Perhaps this is why I agree with Dr. Paul Miller that Extension's future is in education.[11]

I admit, however, that any of these alternatives might succeed. But I am convinced of one thing: County agents, in their present numbers, cannot continue to play the dual role of educator and organizational expeditor.

Conclusion

Having stated my basic conclusions in the beginning and reiterated them later, I will not dwell on them here. Scope notwithstanding, there is much evidence that Extension is continuing to vacillate on the question of its future role. Moreover, while Scope may be effective in coordinating efforts of subject-matter specialists, it has not solved the basic problem at the county level.

If county agents are pressed to be even coordinators of the nine program areas and teachers of a few, their effectiveness as educators is likely to deteriorate. The knowledge of this fact is why good agents often resist the initiation of programs from State and national levels which are borderline insofar as subject matter and interest of farm people are concerned. Good agents know that growth in subject matter and in coordinating duties have reduced their ability to serve effectively the leading farmers of their county. To my mind this is the greatest threat that Extension faces. If we are to command the support and respect of people who are trying to excel in their occupation, then we ourselves must excel in our occupation. If our job is education we must be proficient educators.

This is the only way Extension will get the support needed to build a mature institution of adult education. We cannot have sound growth by

[11] Miller, Paul A., "Adjustment Needed in Extension Thinking and Organization," *J. Farm Econ.*, Vol. XLI., No. 5, Dec. 1959.

vying for leadership in all promotional and action programs of the USDA. We should stop being the "boomers" of new agricultural action and aid programs and be so well informed in all aspects of agriculture that our counsel will be indispensable to farm people and to others.

If Extension wishes to survive as an educational institution we would do well to heed these words of John Gardiner's: "When an institution, organization, or nation loses its capacity to evoke high individual performance, its great days are over."[12]

My parting shot is a suggestion. It is that the next step in perfecting Extension's "blueprint" for the future should be the refinement of a concise philosophy for the Cooperative Extension Service.

As Powell and Benne observed ". . . In the characteristic American way of getting things done, adult educators have done much more educating than philosophizing about it. . . . But there arises critical occasions, critical times when disorder will not serve; when choices must be made. . . . Then, the kind of philosophizing that examines the competing assumptions, the value consequences of alternative decisions, that seeks objectivity in the critical scrutiny of one's own beliefs as vigorously as in that of others: (this kind of philosophizing) becomes a vital concern to the adult educator."[13]

This task should be the next frontier for the Cooperative Extension Service.

[12] Gardiner, *op. cit.*, p. 96.

[13] Powell, J. W. and Benne, K. D., "Philosophies of Adult Education," 1960 *Handbook of Adult Education in the U.S.*, pp. 41-42.

DISCUSSION: THE SCOPE EFFORT AS VIEWED BY AN AGRICULTURAL ECONOMIST

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The Scope Report has provided Les Stice the opportunity to do some self-analysis and philosophizing on behalf of agricultural economists and the Cooperative Extension Service. It seemed to me that he was doing more soul searching on the role of Extension than on the scope of Extension. His thesis that the Scope Report is just the beginning of the very important task of setting the goals and scope of Extension should receive hearty agreement from all agricultural economists. The Scope Report delineates and gives official recognition and support for many broad program areas that were (and still are) questioned as appropriate activities for Extension. Thus, the Scope Report is another step in legitimizing our activities as agricultural economists.

We part company when it comes to implementation of the Scope Re-

port, and the role of Extension and extension economists. Knowing Les Stice, I do not believe that he is as restrictive as his paper sounded. The problem, as I see it, is one of expanding our horizons, not restricting them; of education for action, not reaction; and of developing understanding, acceptance, and support for many areas in which agricultural economists can make a real contribution.

Is Extension to be an educational institution or a service agency? Where do we draw the boundaries? Those are the questions.

In his paper, Stice makes his case for education rather than service. To me, the Scope Report calls for education for action which implies *both* education and service. Raising the educational level and competence of all people must fall mainly on our school system. Surely Extension cannot assume the full responsibility for all education for everybody. Extension's only justification can be education for action.

Education in a vacuum and not put to use has little value if not followed through to desirable action and adjustment. Similarly, research done, written, put on the shelf, and not disseminated makes little contribution to education or society. Extension's job is not one of education alone. If we are to survive—by that I mean understanding, acceptance, and financial support—we must go further than just education. We must continue to be problem oriented, tackle the real problems, and become involved enough to bring about desirable changes and adjustments. To this end, I suggest that the name, "Cooperative Extension Service" depicts what we are, an educational service agency.

To be effective in the area of marketing, you must work with those that are doing the marketing. First is the farmer, but most of the marketing functions are done off the farm. If we are to have an influence in marketing, we must have greater emphasis on work with marketing firms and consumers who complete this cycle. In fact, we can do more good for farmers in many cases by working with a few key middlemen rather than with many farmers directly.

I must disagree with the premise that our prime obligation is to farm people. Farm people have been good supports of Extension, and we all recognize and appreciate that support. But our prime obligation is to *all* people. In fact, in our efforts to delineate the objectives, clientele, scope, and resources needed in marketing in Kansas, we recognize an additional responsibility to youth in their education, understanding and personal development.

The author was concerned about getting too far ahead of our research basis. Apparently, he thought that we would forge ahead of our research on an unsound economic basis. To do something is to run the risk of making mistakes. If we don't make some mistakes, it is a sign that we are not doing anything. The USDA-Land-Grant College–Experiment Station complex

is the biggest research organization in history. A tremendous amount of research is available. We would like to have more and better research but that is no reason not to use what we already have. We can make suggestions for needed research and can team up with others to broaden our abilities. We are better equipped than most of us think and we can do a better job than we are now doing with what we now have.

There was concern that the county agent would be overloaded and that he could not assume all the different roles of Extension. The county agent is a generalist responsible for all programs in the county. There will be continuing pressure for him to become more competent and to assume more duties. We never drop anything, we just add. Somewhere along the line we must take stock of our resources and see what to add and what to drop to make the best use of our limited resources in the public interest. As we get into more specialized areas of agricultural economics, it will be impossible for the county agent to have the ability, training, and time to assume these additional responsibilities. As a result, most of this type of work will have to be done by specialists who do have the ability, training, and time. In these specialized areas, the specialist will want to coordinate with and inform the agent and vice versa.

The alternative of Extension to become an action agency was rejected. It was claimed that our effectiveness would be lost if we were to become "boomers," propagandists or politically involved. We are politically involved and cannot be divorced from politics. But this is not bad. This is where we get the funds to operate and politics and political economics is among the most fascinating areas to us and to the general public. Indeed, if we are to retain our respect and support, we must stick to economics, not politics. But we live in a real world with real problems and we must perform a real service if we are to justify our continuance.

Permit me to relate some of our experiences with the Scope Report in Kansas. I would not do justice to the Scope Report if I failed to recognize the contribution in understanding and acceptance it has made. It is a credit to my colleagues and our administrators that progress is being made. Our annual extension conference in the fall of 1958 was directed toward the study of the report and the preparation of a Kansas Scope Report. Following that, our director of Extension requested that all of us involved in marketing, distribution, and utilization prepare a report to more specifically delineate the objectives, clientele, scope, and resources needed in this program area.

I would be happy if I could tell you that we were ready with an immediate and concise answer. Unfortunately, I cannot. We spent many hours of agonizing appraisal attempting to outline what would seem to be a simple assignment. After many months, we did submit our report to the Director. Undoubtedly, it could be improved and many points were

only partially covered, but it is the most comprehensive report I have seen on the subject. It reminded me of the old cliché—economics is what economists do. It vividly pointed out the broad area involved in marketing, distribution, and utilization. We hope and feel that these reports are giving guidance to our programs and contributing to better understanding and appreciation. In this respect, I suspect Kansas is no different than Illinois or the rest of the country. We are on the way, but still have a long way to go.

Getting back to the Scope Report, I would like to consider the adequacy of the report and where we go from here. Scope at best could only point the direction. As Stice has pointed out, it is not a national blueprint for action. It did set the record straight that economics and sociology are recognized areas for program emphasis. I feel if it has accomplished this limited function, it has done its job.

Now, do we file it and never see it again like so many reports? If so, it has been a wasted effort. Or do we sharpen it, get it into focus, and delineate the objectives, clientele, scope, and needs of the Cooperative Extension Service so they can be understood, accepted, and supported by our colleagues, administrators, legislators, and the general public. This acceptance, or public relations if you prefer, remains as one of the biggest impediments to the implementation of the Scope Report.

The Scope Report recognized economics and sociology as areas for program emphasis, but there still remains the task of legitimizing this concept. Extension historically and traditionally has been production oriented. Like any organization with a history, it is resistant to change. Some of the areas of program emphasis are new and different and are, therefore, subject to automatic resistance. This resistance must be overcome if we as agricultural economists are to do more, for example, in marketing than outlook and grades and grading. Scope is only the first step in overcoming that resistance. It is now up to us to delineate and demonstrate what agricultural economists can do. Our future will depend on how well we do that job.

A final word on the final suggestion to develop a concise philosophy for the Cooperative Extension Service. I agree we need more philosophizing, but when you discuss philosophy, please don't write it down. Once it is written, it becomes like words carved in rock on a mountain—immutable and never subject to change. But this is a changing world and let's not be saddled with an out-of-date philosophy. Extension still has a long way to go to achieve her potential. A flexible and effective education-service agency is the only alternative to a planned economy.

REORGANIZING AGRICULTURAL ECONOMICS EXTENSION WORK

CHAIRMAN: BYRON E. TAYLOR, SOUTH DAKOTA STATE COLLEGE

A CRITICAL APPRAISAL OF THE STATE OF AGRICULTURAL ECONOMICS EXTENSION WORK TODAY

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WE HAVE witnessed, in recent years, a considerable output of studies dealing with appraisals and self analysis in nearly all fields of organized human endeavor. Appraisals have been particularly prolific in the field of education. Curriculum appraisals, methods of teaching symposia, and research and extension workshops have become the hallmark of efforts of what are presumed to lead to more rapid adaptation of education to our changing society. No professional school nor major scientific disciplinary field has escaped this scrutiny. Approaches and scope of these analyses have varied. Some have involved staff in the internal appraisals, others have included "consultants" as an aid to introduce "outside" stimulation for the adaptation. Foundations have supported many of these studies.

It would be quite unfair to say this movement is a fad. It would be more nearly accurate, I believe, to point out that these efforts reflect and are symptomatic of the speed, complexity and significance of the change in the American society in the last two decades. Further, these efforts have, no doubt, identified and clarified objectives which had become fuzzy in many educational programs. They have also created awareness of the need to integrate efforts among and between disciplines and/or skills, whether in teaching, research, or in extension. This has resulted in the emergence of a program development concept or problem orientation and thus has had the effect of forcing more attention to greater specificity in statement of objectives and goals. It has emphasized the need of planning and projection of the elements of the program in a time sequence.

While, in many instances, the appraisal and review of activity has sputtered and has proceeded with false starts and greatly compromised program reports, it has been a healthy exercise. However, I believe we have only begun. The further emergence of integration in our social and economic structure will force continuing evaluations. It is hopeful that in the future the review and appraisal activities of educational programs will not be plagued by the continuous pressure of the force of internal

institutionalism, skepticism of presumed "proprietory rights" of particular disciplinary areas within our organizations. Nonetheless, continuing self appraisals and reviews will become more intense and will, I am certain, lead to better adjustment of our educational programs to the economic and social environment we serve.

One should not gain the impression that interest in appraisals are new phenomena in agricultural research and education. A review of the annual proceedings of the Land Grant College Association will reveal considerable interest and discussion, dating back to the beginning of the association, in needed improvement in research and improvements in educational procedures. Similarly, our own Journal has carried articles leading to stimulation of adaptations in our programs. But most of these discussions and suggestions did not lead to self-appraisals and staff involvement in evaluation. Only in recent decades has there been systematic involvement of staff. Probably the most effective national effort to-date was the self appraisal program offered two years ago by the Cooperative Extension Service, familiarly known as the Scope report.[1] This effort, under the direction of the Extension Committee on Organization Policy of the American Association of Land Grant Colleges and State Universities, stimulated staff reviews at the state staff level and in some instances at the county staff level.

The Scope report emphasized, above all else, the identification of Extension's clientele and their needs in the future in nine program areas. It did not deal, except by implication, with the future nature and orientation of the contributions of the various subject matter disciplines. It did outline the need for staff adjustments, retraining and regrouping. It is a challenging and stimulating report and I believe it to be but a first step in the long process of educational reorientation. It is unique in that it preceded similar efforts now underway in agricultural resident instruction programs. Others on this program have indicated the further implication of the Scope effort to Agricultural Economics.

Since others, more qualified than I, on this panel will be offering guidelines and directions needed in specific areas of Agricultural Economics, I will present some general observations on appraisal relating to economics extension programs.

Critical appraisal should and must involve systematic measurement and interpretation. I must admit that I did not conduct a formal analysis of agricultural economics extension programs. I have some familiarity with economics extension and can offer only unsystematic observations partly gleaned from discussions with nearly a score of Deans of Colleges of

[1] Kearl, B. E., and Copeland, O. B., Editors, *A Guide to Extension Programs of the Future*, 1959, North Carolina State College.

Agriculture and Directors of Extension over this country. I have also benefited from discussions with Extension Economists in a number of states. Sharing some of these observations carries some risk of serving "old hash" but I shall systematize to the extent I can, some of these observations.

1. Some general observations.

One wonders why more elements of the economics extension program cannot be oriented more towards fundamentals of the science. Some have suggested that behavior of some economists and the program of some economics extension workers falls short of its potential educational value. How many consciously introduce some of the concepts of the economic alternatives in the decision making process; the concept of the production functions in the production process whether it be a farm firm, marketing firm, or in the area of economic development. While there is a considerable increase in application of quantitative methods in economics extension programs, one wonders why we have not emphasized even more quantitative methods in the analyses of the clientele's problems. One is encouraged that some workers have successfully applied and have introduced, especially to marketing firms, the technique of linear programming.[2] Since successful businesses must have control in a quantitative sense of the elements of the enterprise, these newer tools in problem analysis would serve as valuable educational pedagogy and command immediate respect of firm management.

A general observation made by many is that there appears to be continued reluctance to use and to demonstrate the use of the tools of economic analysis. The deep-seated adjustments in the agricultural economy ahead require that all participants in these changes have available the best in the tools of analyses. Anything less would contribute to unsatisfactory adjustment processes.

2. Some, yet unresolved, questions.

One problem that continues to be bothersome is that of training or retraining of extension economists. The Scope report, you will recall, devotes considerable attention to this matter. Often, as a program expands or an attempt is made at reorientation, a conflict is initiated between the newly appointed worker and those who have had "years of experience at the game." There is likely to be considerable difference in the academic training in economics between the older and newer man. For example: An aggressive new man may want to change the clientele contact from the firm's public relations representative to someone in the management

[2] This technique was initially and successfully introduced in farm management programs and modifications in enterprise budgeting systems have gained from its application. Individual farm firms will likely not be able to apply this technique themselves as an operational technique.

hierarchy. This disturbs the former extension-clientele relationship and both parties become concerned. I hope that this problem is not viewed solely as conflict between the young and old workers.

It seems to me that once program guidelines are established, needed training or retraining, or changes in extension-clientele relationships, that are required, must be done smoothly and expeditiously. Project leaders and departmental and extension administrators must provide the training and retraining environment for effective program development. The short tenure and high turnover rates among younger specialists reflects this deep-seated problem. The movement up the tenure ladder is not necessarily automatic when program reorientation becomes a major concern. Yet, provision should be made that personnel elements involved in program readjustments are continually evaluated. Administration must be willing to invest in retraining and be ever alert to find most effective use of staff partially displaced by program adjustment.

The pressure of increased subject matter competence has naturally placed emphasis on more doctorates in extension. A side effect has been that many are forced into a research Ph.D. mold. Occasionally some extension workers, ones having the Ph.D. degree, tend to want to impress other Ph.Ds and have overlooked their tremendous educational opportunity with lay people. Part of the high attrition among younger workers, no doubt, is due to the inherent result of present Ph.D. programs tending to engender personal aggrandizement in new-found research of theoretical skills. Somehow some have lost their "educational touch" and embarked on a personal program of emphasizing their newly acquired competence. I believe that the challenge and opportunity in economics extension is so great that young Ph.Ds can find every opportunity for effective contributions.

Ancillary to this matter of loss of potential to economics extension by advanced training, is the thought that the Ph.D. programs for these persons might be revised so that they can move quickly into effective educational programs. I believe also, that consideration should be given to developing undergraduate programs in extension which will serve to undergird future masters and doctorate programs of the more promising candidates for educational leadership. In the light of the Scope report recommendations, the opportunities for doctorates working in extension is most challenging.

The Scope outlines for more effective extension programs in the future implies changes in extension-clientele relationships. This implication bears heavily on economics extension. For example: Traditional relationships in marketing extension, largely with industry associations, may be de-emphasized in favor of more intimate contact with managerial and

decision-making elements of the industry. The same is true, possibly to a lesser degree, in public affairs and economic development programs. One of the risks of more intimate contact arises in that an educational relationship might become, over time, essentially a consultant relationship. Some have suggested that the more intimate educational contact might better be of a kind similar to the "proven" result demonstration used with farmers. For example: An improved retail store layout which increases usable sales space and reduces labor per unit of sales can be effective as a demonstration to other retailers. But aid to particular firms in the selection of particular location in layout, introduction of innovations in product flows, in packaging design and marketing programs, if effective, redound to improving the competitive advantages of these firms. In some cases considerable criticism has arisen. Working only with farmer cooperative firms does not alleviate and, in fact, may intensify criticism.

Extension educational efforts with management of firms in monopolistic competition with others in the industry, is in contrast to similar efforts with farm operators. The impact of the benefits that are derived from the kind of efforts with individual farm operators that are encouraged in farm and home development programs does not immediately call forth a counter competitive reaction from the neighbor down the road. Yet, in the long run, this is precisely what our work with farmers has done; the recipient of our service has gained competitive advantage, but the squeezed out man has not been vocal. But even in the case of large farms, with large livestock enterprises, extension programs with heavy emphasis on managerial aspects, have almost become consultant in character. Furthermore, integration of livestock production enterprises with marketing firms will reduce opportunities for contact with farm management. In this instance, probably special educational programs with marketing firm fieldmen become more tenable.

The requirement of effective educational programs, measured in terms of impact on the industry, means contact with those persons having managerial responsibility. It would appear that well organized intensified short course programs designed for managers would be more acceptable than intense and intimate work with single managements. This problem of extension-clientele relationship will become more acute as firms become larger and integrated, creating greater opportunity for competitive impact of our educational programs on other firms in similar lines of activity.

Another, somewhat unresolved, question relates to the handling of public affairs issues and involvement of extention personnel in conflicts among and between marketing firms. Many examples have been cited

where economics extension may have failed. Occasional moronic behavior of livestock and poultry producers and marketing firm spokesmen on issues of grading or inspection of products, on value of market news reporting, or state barriers to product movements, is testimony to general lack of economic understanding. In view of the tendency towards larger and integrated food processing firms, these issues will intensify as competitive interactions between firms and areas expose all participants to specific economic contacts one to the other. Examples could be cited in several states where a number of extension and other college personnel "joined" one or the other side, giving some measure of legitimacy to the side so favored.

I want to say quickly that the noneconomist and product specialists, most frequently, have tended to slide into this trap. I have wondered whether or not this particular behavior represented intellectual dishonesty or lack of perspective and ignorance. It may be that the particular extension-clientele relationship in these instances is such that alignment of extension workers on one side might be politically "smart." Again the importance of developing the appropriate extension-clientele relationship becomes crucial in public affairs educational programs. Certainly, we should not have that kind of relationship that permits voluntary alignments or creates situations which lead to involuntary alignments on issues that destroy, for many years, opportunities for real economic educational programs. Understandably, extension programs typically are begun as consultant relationships with particular groups. But once begun, I believe we must explicitly recognize as soon as possible, the true role of education. The worker must be at all times able to disengage himself so that he can act in the role of a teacher. Just as the classroom teacher is not expected to conform to the particular beliefs of the majority in his class, the extension educator, albeit more carefully and tactfully, should in the same way maintain his role as an educator.

A more specific observation which I share with many others, is that the public image of economics extension might be improved. For example: the farm management specialist has been too long identified as a "farm records" or "tax accounting" expert. Of course, there is more to farm management than record keeping. I believe the tool of record keeping has become identified with the real objectives of managerial economics. Neither should farm management specialists become identified as the expert on farmstead layout, water management planning, or the man who can operate a transit level. These are elements or tools, less so than are records to be sure which have often resulted in particular images to the farm management specialist.

Occasionally, the marketing economics specialist has become identified

as the layout and systems expert or as the packaging expert. In a less complimentary way, some have become identified as persons who attend association meetings to represent the administrators! Marketing economists can do much to develop the nation of Agri-business. At present, we have not had a ground swell of understanding of the production and marketing integration embodied in this concept.

These comments merely suggest that we must be ever mindful of the need of portraying the appropriate image so that the real objectives of our educational programs are not adversely affected. Great care must be exercised so that the "tools in our kit" or the skills that the public sees do not become the sole painter of the image of the real worth of our educational programs.

My remarks above have deviated from my views of what constitutes a critical appraisal. I did pass on to you some observations made by our colleagues. I do not believe that I, nor anyone else, can really appraise critically economics extension unless we ourselves have gone through the process. A critical appraisal of agricultural economics extension presumes that we *know* what our educational *outcomes* are; that we *know* and can *measure* particular behavioral reactions of all our clients as a result of our educational effort. Strictly speaking, it means that we can identify and specify immediate, as well as, longer run and interacting behavioral reactions of our clients as a result of our effort.

Obviously, I did not, nor could not, undertake such an assignment. This assignment, as I have specified, means self analysis and systematic involvement of personnel affected in appraisal. If we are concerned with the measurement of our effectiveness, we must measure our educational impact on clients or students. This becomes very tricky. For example: Did the farmer buy the new purebred bull because economic analysis showed its purchase would be profitable, or because of the prestige value that ownership of this animal might reflect to himself in his neighborhood.

All extension personnel and economics extension, in particular, can take a cue from the overall guidelines established by the Scope report. I believe that the appraisal process cannot be done solely by outsiders, that it is an intimate, intellectual, soul searching exercise in the company of our colleagues. I am pleased that several departments of agricultural economics have conducted programs of appraisal and reviews. It is encouraging that those with which I am familiar have included researchers in the appraisal program. I sincerely believe the appraisal process must include counterpart research personnel, as they have real stake in developing research that is useful at the "point of contact" of extension workers. And as extension-clientele relationships change, research pro-

grams must be planned so that they can be useful at the intended point of impact, namely, whether to the management of firms or for broad scale distribution, or other points or levels of educational contact. More conscious planning is needed so that potential research application can be geared quickly into expected use in extension education.

It is my impression that most appraisal programs are weak in that possibilities of measurement of the achievement of expected educational outcomes or goals is not explicitly provided for in these analyses. Although this is most difficult, we cannot measure our effectiveness unless we do attempt to quantify the impact of our programs. The Congress and state legislatures expect us to be able to do so. The future of extension education and, in fact, all agricultural research and education is singularly tied to our ability to measure our worth and the impact of our programs. Formal appraisal reviews could be a "single shot" effort but full scale appraisal is a continuing effort and one which insists on continuous measurement of results.[3]

I hope no one will feel that I have cast too many stones. If some feel that I have, they should feel free to cast them in a large heap upon me. I feel that I am part of, and have some responsibility for agricultural education, so any unwarranted comments shared with you, can be redirected to me.

I would like to, in summary, paraphrase some comments of some Deans of Agriculture (all non-economists) on economics extension programs. One wondered why economists did not provide County Extension Agents with more tools of economic analysis, for they handle problems daily involving economics. He implied, facetiously, that this should be easy as principles need be taught only once and you don't have to worry periodically with new facts on drugs, varieties, etc. Another commented that extension economists must be the most highly trained on the staff as they must be able to reach those charged with decision making in policy, marketing and farm management. A third suggested that extension economists are the one group that "give body and content to the concept of what the Land Grant Colleges or Institutions can accomplish." Further, he stated their behavior, skills and programs "can make up the profile of the image of dynamics of the Land Grant College Movement." A fourth commented that our extension economists "must be top men, skilled in research techniques and at the same time nimble and astute in their client relationships with industry. Further, the requirements of the adjustment process in this state are such that this field is

[3] It is hoped that measurement does not take the traditional form of miles traveled, number of meetings held, etc., but rather emphasize what has happened to our clients as a result of our efforts.

vital, that our economists must be able to quantify to make sense to clients and that intuition based educational prescriptions are obsolete."

Concluding, I wish to suggest that the effective appraisal process is properly an activity at the local departmental level; that it must set achievable bench marks, provide for measurement of outcomes, that it should identify all elements of the adaptive process internally as well as that expected in clients, that it include the researchers and teachers as well, since economics extension cannot do this task alone without support and understanding of others in the department.

The challenge of economic adjustment places tremendous responsibility on economic extension for moving out in effective educational programs. The very success of the Land Grant College in the next several decades rests heavily on economic extension. The focal point of public contact rests on extension workers and the educational outcome of extension workers really measures to a *large* degree the educational outcome of the College of Agriculture.

DIRECTIONS NEEDED IN EXTENSION FARM MANAGEMENT WORK

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A WHIRLWIND of technological revolution, sociological adjustment, and institutional change has farm families all over the United States spinning. Hay balers—floor waxers; feed augers—food freezers; more land—part-time jobs; feed-grain programs—parent-teacher programs; herbicides for weeds— penicillin for germs; antibiotics to make cattle grow fatter—diet foods to make the family stay thinner—all these have complicated the decisions facing farm families.

Good management ability has always been important and usually rewarded. But today's whirlwind of complex technology, narrow price margins, borrowed capital, tremendous time and energy pressures, and demands for higher living standards place a real premium on the farm family's knowledge of management concepts and capacity to use them in decision-making.

The Cooperative Extension Service can hold out a steadying hand to families caught up in this whirl. An essential element in doing just this was the recognition in the Scope Report that a major function of Extension is to join with people in helping them to identify their needs, problems and opportunities; study their resources; become familiar with specific methods of overcoming problems, analyze alternative solutions to their problems where alternatives exist, and arrive at the most promising course of action in light of their own desires, resources, and abilities.[2] Teaching farm families to follow basic management process is also the major objective of the "Management on the Farm and in the Home" section of the same Scope Report.

The growing need for better management capacity on the farm and the recognition of this need by the Cooperative Extension Service challenges the extension specialist in farm management to provide the necessary initiative and leadership in shaping tomorrow's extension farm management work. The essential basis for directing such an effort is (1) a clear understanding by administrators, specialists and county extension workers of the essential elements of management; (2) recognition of variations in individual farm family management capacity; and (3) oppor-

[1] The author expresses his indebtedness to Professor Robert Rieck for helpful comments and criticism of the initial draft of this paper, and for presenting it at the meetings of the American Farm Economics Assn.

[2] *The Cooperative Extension Service Today—A Statement of Scope and Responsibility*, Fed. Ext. Serv., 1958, p. 4.

tunities and limitations unique to an educational program aimed at improving management capacity.

Management in its simplest form is the manipulation and control of a limited set of resources. Nearly every person is a manager of a given set of resources. The basic objective of management is to get the most of what is desired within the limitations of the resources available. To accomplish this, there must be an organized process of examining resources, goals, and information, and then these factors must be ordered in the most satisfactory way. This is the process of management. There is very little consideration of the fact that management ability is possessed in varying degrees. The major question is how can an educational program be most effective in improving management ability.

It must be recognized that the management of farm family operations is most frequently carried out by a management unit consisting of the husband and wife, and, in some cases, other members of the family. Any attempt at teaching management must recognize this fact. Husband and wife involvement in management education is therefore essential.

A closer look at the ingredients of management will provide greater insight into possible approaches to teaching management. Management is composed of three essential elements: (1) The hard core center of the individual manager is his basic decision-making ability; (2) this hard core is surrounded by a body of economic principles, management concepts, and working tools; and (3) a collection of facts and relationships which are related to the problems at hand through the decision-making process and economic concepts.

The Decision-Making Core

Decision-making ability is possessed in varying degrees and is learned in many different ways. The decision-making process, or the scientific approach to it, is formally taught in grade school science classes, high school chemistry, and college logic, and it is frequently learned in the school of hard knocks. Without this orderly process of problem location, information gathering, and analysis, no quantity of facts and information or budgeting tools and record analysis is sufficient in maximizing personal satisfaction.

The fact that organized decision-making can be taught is best evidenced by the comparative analytical abilities of the eighth grader and the college graduate. Graduate programs in agricultural economics provide further evidence of recognition of the essential importances of decision-making and the fact that it can be taught. Considerable emphasis is placed on research methodology in graduate programs. This methodology in itself is an orderly process of approaching problems or problematic situations.

Teaching decision-making is the core of many extension educational

efforts. One of the most frequently referred to at present is program-planning. This is essentially an organized process of group decision-making relative to extension programs. Although not solely the aim of the management specialist, the need for good decision-making has been, and still is, most commonly recognized by this group as essential.

Management Concepts and Tools

An important adjunct to the good decision-maker is a clear understanding of management concepts, economic principles, and analytical tools. These concepts and tools are essential to the proper collection of information and later analysis. It is these very concepts that give order and organization to the information gathered by the individual manager. A program aimed at management education must include such principles as added cost, added return, opportunity cost, diminishing returns, fixed and variable costs, and others. Farm families should have a working knowledge of the more simple and pragmatic concepts.

The working tools necessary to fit the pieces together are important. Farm records, budgeting techniques, cost account methods, planning, and analysis procedures are representative. In the past, management specialists have frequently concentrated almost all their efforts on farm records and accounts. This is only a tiny segment of the total task and responsibility of the manager. True, the management unit must keep records, but in addition, management is responsible for planning and controlling the future of the family and farm.

These management concepts and economic principles have application throughout the Extension Service, as it attempts to reach its goals within a framework of limited resources.

Facts and Relationships

To manage most effectively, the individual farmers must possess, or have ready access to, a body of facts and relationships which can be used in conjunction with appropriate management concepts and the basic decision-making process. These facts and relationships must be in a form that lends itself to the decision-making core and management concepts and tools. The good manager is interested in information which can be used in making decisions rather than in arriving at a pat answer to his problems.

The good manager must possess all three basic management attributes. A poor decision-maker who does not order available information and management concepts will fail in his effort to achieve his goals. The good decision-maker with a grasp of management concepts and tools must have access to the right kind of information to be effective. The manager with a large body of facts and good basic decision-making ability,

but with no economic principles, management concepts, and tools, and no system of fitting information to good decision making, will be an ineffective manager.

In directing future extension farm management work, extension workers must look at the total management unit in the light of the three major elements of the manager: (1) Decision-making ability; (2) comprehension of the body of economic principles, management concepts, and tools; and (3) quantity and quality of the information at hand. Strengths and weaknesses of the individual management unit must be sought out and worked on. It would be inappropriate, for example, to attempt to teach the decision-making process to a graduate chemist turned farmer. Nonetheless, this very person may be in great need of an educational program aimed at teaching economic principles, management concepts, and tools, as well as a broad spectrum of information about farming. On the other hand, there is limited value in presenting general information to a farmer whose greatest weakness is the lack of orderly thinking.

If the decision-making core is the individual manager's weak spot, it should be attacked. If the individual's grasp of management concepts is poor, strength should be added. Continued effort should be extended the dissemination of information to all farm families.

Tomorrow's Extension Program in Farm Management

Variation in individual management strengths and weaknesses dictates an extension program which recognizes differences in need. To be most effective in meeting these variations in need, tomorrow's extension work in farm management must take the following form:

1. Farm management workers must direct closer attention to the basic educational purpose of Extension. Service aspects of the work must be clearly differentiated from those that are educational. For example, work with Farm Record Cooperatives or Farm Management Associations undoubtedly has considerable educational merit for the new association member. He can be taught to keep better records, to locate weak and strong points in the business, and to acquire other important management skills. Continued effort by the extension worker in individual record summary, farm analysis, or income tax is questionable, for this is closer to service than to education.

It should be recognized that service work is important as a motivational device. As the line that divides service from education is not always clear, extension workers must continually appraise their work and endeavor to place major emphasis in the direction of education.

2. The dissemination of information has always been a prime target of farm management in Extension. Particular emphasis has been placed on educational programs in outlook, income tax, social security, leasing,

property transfer, and credit, as well as cost and returns. This is appropriate, for the individual manager must have a working source of useful information. However, if the basic objective of an educational program is to teach farm families to be better managers, it is no longer safe to assume that the individual possesses the decision-making core and the adhesive management concepts and tools to handle the information being distributed. The dissemination of information without concern for its relationship to the entire farm family operation is out of date.

Much greater emphasis now than was formerly customary must be placed on the teaching of decision making, principles of economics, management concepts, and tools. New approaches and techniques must be explored. Teaching basic decision-making and management concepts is difficult because of its complex and sometimes abstract nature. It can be extremely rewarding work with long-range benefits. If extension workers attack this with the same skill and enthusiasm of previous efforts, much can be accomplished.

The dissemination of information on cost and return relationships, or on the experiences of other farmers, is not to be confused with the teaching of management principles. Neither is it enough to show farmers how to fill in the blanks on a particular set of budgeting forms. What must be taught is the use and application of the forms themselves. Times change and conditions vary. The individual must have a clear grasp of the more basic concepts in order to correctly utilize the tools provided.

3. Since individual management ability is extremely variable, future extension work in management must be tailored more closely to the needs of the individual. If Extension's resources were greater in terms of personnel, close attention could be directed to the needs of every individual. But as this is impossible at present, Extension must continue to meet the needs of the people through some combination of group and individual work.

To be most effective, tomorrow's county extension worker must know his clientele. He must be well prepared in management and able to recognize individual needs. Extension programs must be aimed at the specific management needs of individuals. Most extension meetings should be by individual invitation based on the purpose of the meeting and the needs of the individual. If individual management ability is to be upgraded, less attention should be focused on the broad general meeting to which everyone is welcome.

4. It is difficult to teach basic decision making, economic principles, management concepts, and tools, on a one-shot meeting basis. To be most effective, such an educational aim must be met by a series of learning experiences with as close attention to the individual as possible. For this reason, greater emphasis needs to be placed on the short course, small

group series, or management school approach which brings the teacher, who may be a specialist or county worker, into closer contact with the individual over a longer period of time. This is the heart of the strong argument for the individual approach so much a part of the "Farm and Home Development" effort in many States.

The dissemination of facts and economic relationships through mass media should continue. Mass media provide the most efficient means of placing this information at the disposal of farm people. Unfortunately, in many cases the type of management help which can be presented through mass media has not been sorted out. Extension workers in many cases have only scratched the surface of television, radio, and the printed page. They continue to tax the patience of their farmer clientele with general "one-shot" meetings on subject matter which their clientele has already read or been exposed to through other media. Witness the never-ending traditional annual county meetings on "Outlook" or the annual "Farm Tour."

Meetings of this nature may have some public relations value, but little reliance should be placed on them as an educational device. This is particularly true in farm management.

5. The county extension worker should direct his efforts in management education to the younger farmers and the beginners in farming, because: (a) A time-consuming intensive educational program aimed at teaching basic management will have an impact over a much longer time if taught to young farm families. (b) If the educational effort is successful, farmers will be better prepared to make individual farm adjustments to changing technology and times. (c) Management concepts are not learned so easily—as are other farm skills—by working on a farm, or by watching a farmer, they should, therefore be a part of an early educational effort. (d) A good grasp of basic management principles will provide an improved framework with which to understand information provided through mass media. (e) There is a broad base of management concepts and information applicable to nearly all farmers which the county extension worker can readily prepare to comprehend and to teach. (f) Through education farmers in a community will more readily recognize the position of the county extension worker and the help he can provide.

6. The extension specialist in farm management should support the county extension worker through agent training and the development of materials. The specialist in management should redirect his efforts in the use of mass media, concentrating less time on the "one-shot" general meeting and more time on the presentation of facts and relationships through the broader mass media of television, radio, newspaper, and publication.

The county worker should call on the specialist for direct farmer contact with the more advanced farm managers. It is impossible for the county worker to be a specialist in all fields, but if he has helped young farm families with their management problems, he will be able to direct them to the specialist who can be of greatest help.

The specialist in management might very well combine his efforts with other subject matter specialists to work on the management problems of all farmers and to present the resultant information through mass media. In addition, the more complex principles, facts and relationships might be presented through direct contact with a selected group of more advanced managers. Strong support must be given the series approach—a series has greatest merit if specialists concentrate on teaching principles and not just the presentation of facts and relationships.

Summary

Allocation of scarce resources is the management problem faced by every State extension staff and every individual extension worker. Farm management specialists are faced with many alternatives for resource use. Accepting new challenges may mean reduced emphasis in present areas of work where specialists have been successful and feel comfortable. It undoubtedly means striking out into less familiar areas.

If extension farm management work is to concentrate more effort on education in basic decision-making and management concepts, there is need for critical analysis of present efforts in "one-shot" general meetings, on outlook, income tax, and "pat-answer" information. Work with farm account cooperatives must also be reviewed carefully to insure the wisest use of limited resources.

Extension work in farm management is in position to make a substantial move forward. Management work can be an essential directing force in future extension programs. Success or failure depends on the farm management specialist's ability to take the first big step which is one of self-evaluation.

DIRECTIONS NEEDED IN EXTENSION MARKETING WORK

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THERE are many opportunities for extension personnel to assist in educational programs in agricultural marketing. Not only do extension staff members have opportunities, but they also have responsibilities to provide usable marketing information to their publics.

In the past decade, three separate publics have been identified as recipients of extension marketing programs. These are farmers, managers of agricultural marketing firms, and consumers.

Agricultural economists have proved that they have significant contributions to make to the marketing problems of each of these groups. The purpose of this paper is to suggest how agricultural economists can maximize their contributions.

Marketing Work with Farmers

The objective of extension marketing programs with farmers is to enhance their profit position by providing them with the marketing information necessary in making sound buying and selling decisions. Extension should provide information on what, where, when, and how to buy inputs and sell products.

In the past, we have neglected the input part of marketing. We have not kept farmers informed about the changes taking place in agricultural marketing and how they can adjust to these changes to obtain the largest net returns.

County agents long have been identified as important contributors to more efficient farm production. In the future, they need to increase their assistance to farmers in marketing. Today, a large number of farmers are more sophisticated about economics and marketing than the county agents who are serving in their counties. In-service training in economics and marketing needs to be done for all county agents. In counties with larger staffs, at least one agent needs a thorough understanding of economics and marketing. Training is an important job for marketing specialists.[1] I have observed a reluctance on the part of marketing specialists to conduct in-service training for county agents. Much training must be done if Extension is to meet its obligations with farmers.

Production specialists (e.g., specialists in Departments of Dairy,

[1] One thing that would help Extension is a standardization of titles. In this paper, the title "marketing specialist" is used to denote either an extension marketing agent or an extension specialist with training in agricultural economics who works in marketing.

Poultry, etc.) are now more interested in marketing than ever before. Their training has usually been in commodity fields with concentration on technology. Much of the marketing work they do is in the quality area.

Production specialists have a place in extension marketing programs. In my view, they could maximize their contribution if they teamed up with marketing specialists. Marketing specialists need to cooperate with production specialists on marketing problems. They can assist production specialists in recognizing the importance of economic and marketing principles, and they can help train production specialists as well as learn from them.

Experience has led me to believe that over 90 percent of all agricultural marketing problems can be solved if business, economics, engineering, and technological (commodity) knowledge are combined and used on these problems. This knowledge is available in most Extension Services. More specialist teamwork will be needed in the future. A team of two specialists—a marketing specialist with business and economics training, and a production specialist—can solve many marketing problems.

Farmers in 1961 are interested in working together to solve their marketing problems. Extension in the future will be working more with groups of farmers on marketing problems and less with individual producers. These groups will be legal cooperative and noncooperative business organizations. There will be increased emphasis on marketing orders, bargaining associations, marketing efficiencies, new technologies, consumer preferences, etc. Marketing specialists must contribute in these areas. Giving outlook talks is not enough.

Some people in this profession feel that farm management specialists should handle all of the farm-level marketing work, and that marketing specialists should concentrate their efforts with marketing firms. In my opinion, farm management specialists do make contributions to farm-level marketing decisions. However, many of them need to learn much about marketing before all farm-level marketing work is turned over to them. Farm management extension work should include the marketing perspective.

Marketing Work with Firms

The objective of extension marketing programs with agricultural marketing firms is to provide relevant data which will enable firms to maintain optimum operating conditions with respect to competitiveness and profitability. Much education in management will be needed in the future if marketing firms operate efficiently, remain competitive, and earn adequate profits.

The team effort can be used successfully on marketing problems of

marketing firms. Consulting companies have used the team approach for years. Some marketing firms have received valuable help from extension personnel in the past. There is a need to increase marketing efforts with marketing firms. Some have stated that this work deserves the bulk of our marketing funds and program time. I feel that there needs to be balance. Farmers and consumers should not be neglected in extension marketing programs.

In the past, extension personnel in many states have worked with cooperative marketing firms to the exclusion of noncooperative firms. Some executives employed by noncooperatives believe extension personnel will work only with cooperatives. This belief limits the work and its effectiveness. Marketing problems of cooperative firms and noncooperative firms are similar. Business, economic, engineering, and technical principles apply to both. We need to work with both kinds of firms.

Many managers of marketing firms need assistance from Extension; most of them want management help. There are opportunities to train managers in management principles (e.g., planning, organizing, directing, and controlling). Also, they should be given assistance with problems of finance, accounting, personnel, etc. Firm-oriented marketing specialists have excellent opportunities to provide leadership in these management areas. Each marketing specialist should concentrate upon becoming proficient in at least one area.

Some national marketing firms also seek our help. They are willing to work with us if we can help them apply linear programing, queuing theory, operational efficiency, and commodity analyses. They are interested to learn farmers' opinions and attitudes. There are also opportunities to work with firms on vertical integration, other changes in marketing structure, and economics of location. Work should be done on industry problems as well as firm problems.

Much marketing research is available and marketing specialists must make sure they know about it and use it. Marketing research done in industry as well as in the USDA and the Experiment Stations can be useful when working with firms.

To be able to maximize their contribution, marketing specialists must use the most advanced tools available. A thorough understanding of economic theory is a must for marketing specialists. Production economics has as much application to firms as to farms. Marketing specialists have not used production economics as they could and should. In my view, extension marketing specialists need the same professional training as researchers. They also need ability to simplify the theory and use it on the problems the firms have.

Marketing specialists inadequately trained can get themselves, their

department, and the Extension Service into more hot water faster than any other specialists. Good ones can be the biggest assets a department and an Extension Service can have.

Agricultural economics department heads have a responsibility to employ competent marketing specialists and help them remain competent. It becomes doubly important that they carry out this responsibility because of the difference in assignments with regard to field work and travel. Research workers generally keep up with the profession, specialists tend to slip behind. Department heads can watch this better than anyone and thus assist all specialists.

Since the jobs of marketing specialists are as difficult as those of research workers—if not even more difficult—they should be paid as well as research workers, or better. The tendency has been to reward researchers better than specialists. For these reasons, many specialists, after a few years in Extension, shift to research or take commercial jobs. Marketing specialists need long experience in Extension if they are to make their maximum contribution to extension marketing programs.

Extension marketing specialists must contribute to the profession by writing journal articles and accepting opportunities to deliver papers at professional meetings. It is up to them to prove they are equal members of this association.

More regional extension marketing programs need to be initiated. Marketing specialists need to help develop regional projects.

Marketing Work With Consumers

The objective of extension marketing programs with consumers is to provide marketing information that provides increased satisfactions from expenditures for food. We should also help consumers understand the marketing system. Extension can assist consumers by providing information about quality, quantity, grades, supplies, and prices of foods, to help them decide which agricultural products to buy, and when to buy them.

For 12 years, we have had consumer marketing programs in Extension. There is a need for more economics and more marketing in these programs. Most consumer marketing agents were trained in home economics with little course work in economics. A few of these agents have done some advanced work in agricultural economics, but the over-all knowledge and use of economics is not what it should be.

A large number of heads of agricultural economics departments have not supported consumer marketing extension programs. Some have expressed negative attitudes toward this work. They should back these programs and encourage well-trained marketing specialists to work in the consumer marketing area.

There are many opportunities for marketing specialists to contribute to consumer marketing work. Much could be done in training consumer agents. Consumption economics needs to be used. Well-trained marketing specialists are needed as project leaders in consumer marketing programs.

Some General Recommendations

The Scope Report outlined the responsibility and opportunity for marketing educational programs. The Extension Committee on Organization and Policy has encouraged State Extension Services to expand their marketing staffs and programs. Some have, but others have moved slowly.

An extension director must give more than lip service to an expansion in marketing. He must be convinced that there is important marketing work that needs to be done, and do everything possible to impress upon his colleagues and subordinates that his Extension Service is going to have effective marketing programs.

Budget control and direction can be used more in the future than in the past. Directors can designate a marketing program leader and give him the authority to develop marketing programs. Administrators and supervisors can be taught economics and marketing principles.

Supervisors are key individuals in State Extension Services in any program. The weakest link in Extension today with reference to marketing is the district supervisory staff. When supervisors are convinced that marketing is important, programs at all levels with all publics begin to move. Directors can do much to assist marketing when they convince supervisors that it is important. Marketing specialists have a responsibility to convince supervisors that marketing is important.

Marketing is different from 4-H, home economics, and agricultural production. Extension administrators should recognize that much work with marketing firms can best be done by specialists working directly with firms. The policy of all extension programs going through county offices needs to be changed to permit specialists to work directly with firms. Marketing specialists need to point this out to extension administrators. They also need to keep county staff members informed of their work with firms in the counties.

I have suggested that marketing specialists should work with farmers, managers of marketing firms, and consumers. I do not feel that an individual marketing specialist should work equally with all three publics. More effective programs can be developed if an individual marketing specialist spends a greater part of his time with one public. He can contribute to the programs with the other two, but should not attempt to divide his time so as to spend a third with each.

If finances in a given State Extension Service do not permit the employment of several marketing specialists, then the extension marketing programs should be directed to one or two publics. Funds used in other extension programs could be shifted to marketing in many States if more marketing specialists are needed. Marketing specialists have real opportunities to provide leadership in Town and Country Business programs being developed currently.

Summary

There are many opportunities and responsibilities for extension workers to develop marketing programs. More group work and less individual work needs to be done in marketing because of the size of our publics and the changes that are taking place.

All extension staff members can contribute to a marketing program if they understand the problems, are trained, and believe they can help with solving marketing problems.

Marketing specialists have many opportunities to train county personnel as well as production specialists in the principles of economics and marketing.

Marketing specialists need to increase their work with marketing firms. Neither American Marketing Act monies nor extension marketing programs should be concentrated exclusively in the marketing-firm area. There is a need to work on farm-level and consumer-level marketing problems as well.

Marketing specialists need to be well trained. They must keep up professionally by reading, writing, and studying.

Heads of agricultural economics departments should employ highly competent marketing specialists. They need to support all extension marketing programs. They can and should encourage marketing specialists in their departments to work cooperatively with specialists in other departments. There is a need for more teamwork among disciplines.

There is a special need to include more economics and marketing in consumer marketing extension programs. Marketing specialists should contribute much more to consumer marketing than they have in the past.

As a group, extension administrators have not supported Extension marketing programs as much as they could. Marketing specialists can help extension administrators and, in particular, supervisors to see the opportunities for Extension to develop and expand marketing programs.

DIRECTIONS NEEDED IN EXTENSION PUBLIC POLICY PROGRAMS

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The title, including the words "directions needed," implies the need for new developments or changed emphasis. To develop the title assigned, we will discuss (1) a recent development in extension work and (2) some directions needed in extension public policy programs and methods.

DURING the early 1950's, the Cooperative Extension Service was faced with two major alternatives as to the direction extension work should follow. They were (1) to continue the emphasis on subject matter directly connected with agricultural production or (2) to broaden the scope of extension work to include the larger realm of human affairs.

Recent Developments

The latter direction was chosen, and there is no likelihood that we shall turn back, or that we should. This choice was made because the growing interdependence between farmers and other sectors had widened the circle of those who have something to say about the issues, policies, and directions of agriculture. These interrelations projected the interests and problems of farmers and related industry personnel into the larger realm of human affairs. This magnified the economic and social affairs of agriculture—the need for optimum use of resources, the development of communities, the policy making at the local, State, and national level, and others. As economists working in public policy, we have some skills and responsibilities in helping to shape the broadened scope of extension work, particularly since this new scope placed more emphasis on the social sciences.

It may seem trite to suggest the role of the extension economist in public policy is education, not indoctrination. However, it must be repeated often. The objective is to provide the basis for people to take intelligent action through proper channels—whether in the ballot box, through organizations, or with legislators. The program must be comprehensive enough to develop the ability of people to identify significant issues, to analyze alternatives of such issues, and to evaluate consequences of the various alternative solutions. It should permit each person to determine for himself his choice of alternatives. The conclusions reached as a result of the educational process are to be used by those having responsibility for initiating action whether legislatively, administratively, or otherwise.

Some Directions Needed

Many agricultural leaders and nonfarmers are not well informed on the multitude of activities and the numerous programs of their Government affecting them. They lack the time, incentive, information, or skills to identify clearly and to analyze public issues.

With the broadened scope of extension work, it becomes our responsibility to provide assistance with the broad issues related not only to Government agricultural policy on farm programs, but also to taxes, resource adjustment and development, zoning, schools, highways, community development, aged, and migratory labor. Foreign trade and policies relating to agriculture are important, but we need to expand our programs to include the broad international dimension of foreign affairs and relationships. The latter may well be the most important public policy issue in the years ahead. People in policy work need training particularly in economics and political science if the broad scope of Extension is to fulfill its purposes.

We need especially to give more attention to reaching three important segments of our people: (1) The masses, (2) local community leaders, and (3) special interest groups. This, of course, must not depreciate our efforts with farmers.

Contacting the masses

We need to expand effectively our mass media approach in public policy education. We need to provide objective and thought-provoking background and explanatory materials in simplified form on public policy issues. The strongest criticism of a mass media approach is that it lacks depth. Large dramatic visuals will be particularly helpful in presenting concepts and principles to emphasize major points. We need to develop effective mechanisms or techniques for use in television. The methods and programs will depend upon the imagination, initiative, and skills of individual workers.

A promising method being used in a few States is the self-administered discussion technique. A problem of importance in the State, such as employment, taxes, resource development, is selected. A series of leaflets, prepared by specialists, provide discussion questions and some related material. The problem selected must be localized. It must be presented in a manner that will create awareness and arouse interest on a particular problem with a wide audience. Brochures are usually prepared to precede the actual discussion. The discussion leaflets are distributed by Extension agents to individuals acting as discussion leaders. The small discussion groups composed of six to 10 people meet in various homes at regular intervals to discuss the designated topic. News releases, radio programs, and television shows preceded the discussion period. Concen-

trating the effort into a given period of time provides opportunity for mass media education.

Careful planning and coordination with other groups is a necessity; otherwise, conflicts or adverse effects may occur. College seminars on the problem area are helpful in obtaining understanding and cooperation.

Working with lay leaders

The most serious fault of extension public policy work is the superficial treatment often given subject matter. True understanding and sound individual conclusions in controversial topics can only be attained after intensive thought and study. We need to move in the direction of workshops or forums to teach subject matter in depth.

In Ohio, agricultural resource adjustment workshops are most often organized for 5 sessions lasting 2 hours a day for 5 days, or for 2 full days. They are organized on a county basis with 30 to 50 people attending regularly. This approach provides a sound educational environment in which people can really explore problems and the various alternatives in light of their own values and in view of the expected economic, social, and political consequences. The process, though slow and unsensational, is nevertheless effective if Extension agent, participant, and administrative opinion is valid criteria. This grassroot approach, over a period of time, will pay large dividends in public policy understanding.

Forums or workshops on a district, area, or State basis provide an educational service to a higher echelon of lay leaders. We need to direct more programs to this group.

Working with special interest groups

Special interest groups such as farm organizations and commodity groups are major initiators of various public policy actions. We get sound programs only when lay people and policy development groups are able to appraise meaningfully the consequences of present and proposed programs. Extension has a responsibility to these groups.

Emphasis needs to be placed on teaching of principles and basic information. This will help answer immediate and future problems for all groups. Policy development groups have a great need for research findings. Too often we have been compromising biases with but few facts. Applied research finds a ready audience. Economists can make themselves heard more plainly in public policy matters with more research—both basic and applied—on public policies.

Public policy work is now being done in most Land-Grant institutions. In a few States, extension teaching in policy is a full-time assignment. In most States, public policy work is combined with work in farm management, marketing, or outlook. Fragmentation must be reduced if policy

work is to make its maximum contribution to the total extension program. Since more depth in policy is needed, a partial solution for those in fragmented situations is to direct attention to one or two major problem areas. Concentrating on a few areas will get better results than trying to cover the entire public policy field.

There is a tendency toward joint appointments in both Extension and research. This can play an important role in upgrading the extension workers' status in our educational institutions. This should be a two-way movement with some research workers doing extension work and some extension workers doing research. The aptitudes of research workers are extremely important. Researchers will benefit from the close contact with agriculture on what farm people are thinking, and what their problems are. Here too we must be cautious to guard against over fragmentation.

Extension policy workers should benefit from doing some research. The application of broad theoretical concepts related to policy will improve total effectiveness. Some individual extension workers may lack the training or the desire to shift from their Extension concerns to research. The training and attitudes of individual extension workers will be important to the success of joint appointments. The attitudes of administrators are extremely important. Conflicts in schedules and responsibilities will surely arise, and both staff and administrative decisions may well determine the success of joint appointments.

Extension economists must be as highly trained as research workers if they are to be as successful. More extension workers in public policy in the future should have the Ph.D. degree. However, Extension will not acquire and hold highly trained personnel unless it continues to give diligence to finding means to compensate its staff with salaries comparable to those of research and teaching. In fact, there is merit to the conclusion of some that, because of travel and pressures in Extension, compensation in that area should be greater than in teaching and research.

Conclusion

Problems mentioned here are not new to extension public policy. Let's not be discouraged or frustrated by them, but rather accept the challenges they present. Public policy work is gaining momentum and accelerating rapidly in this country. Public policy will continue to move forward with dedicated and highly trained personnel. Contributing to the momentum will be understanding administrators, individuals, and groups —both public and private. I am confident that educators concerned with policy, programs, and methods will move in directions needed to meet the challenging responsibilities of the future.

APPLYING ECONOMICS IN AGRICULTURAL EXTENSION

CHAIRMAN: FRED L. OLSON, UNIVERSITY OF NEBRASKA

USE OF ECONOMIC THEORY IN EXTENSION PROBLEM-SOLVING

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MANY American farm businesses and agricultural marketing firms are making very low returns on their investments. For example, of some 250 specialized dairy farmers cooperating in the Michigan Farm Business Analysis Mail-In Project in 1959 and 1960, the proportion of farmers receiving less than a dollar of income per dollar of total expense was as follows: 54 percent of the small farms (under 30 cows); 42 percent of the medium-sized farms (30-50 cows); and 30 percent of the large farms (over 50 cows). Total expense included all cash expenses, depreciation unpaid family labor, the operator's labor, and an interest charge on the investment.

We cannot expect better or even large economic extension programs alone to correct the farm income disparity. However, we do suggest that education—one of the primary roles of the Extension Service—does have an important part to play in the solution. The Extension Service has been with us for nearly 50 years. Throughout this long period, extension programs have changed in many ways but have continued to maintain a very strong technology orientation. Almost all extension economists concede that continued improvement and strengthening of agricultural technologic research and application are vital necessities. However, the present agricultural situation with its many problems has developed in spite of our widespread research and extension educational efforts. Programs of the future must be fresh and bold but redirected in emphasis and content to make a more serious impact on the major problems confronting farmers and marketing firms. At the same time, these programs must achieve a proper balance between using the knowledge and experience of the past to keep our educational efforts from "blowing up"; yet we cannot afford the luxury of letting a single new idea or innovation escape lest we find our programs "drying up."

What is the contribution that the extension worker can make? The

[1] I have benefited from suggestions and helpful criticisms of Richard G. Wheeler, John R. Brake, Alan R. Bird, Karl T. Wright and my agricultural economic extension colleagues. Responsibility for what is presented here is, of course, mine.

good extension worker, teacher, or educator—and the terms are somewhat synonymous—can do these four things:

a. Provide facts or information
b. Show people how to use the facts or information
c. Inspire or motivate people to use information
d. Teach the management or decision-making process.

The extension economist—like other extension workers and teachers—does the first three of these things. However, unless extension workers have had some training or experience in economics or have been associatd with economists they are not likely to recognize or have much appreciation for teaching the decision-making process. Too many extension workers still think of economics as something that operates in a vacuum. They are not unlike the editor of a leading farm magazine who recently suggested leaving economics to the economists to avoid confusing the technology students. The extension economist by contrast recognizes that sound application of facts and information depends on presenting and interpreting them within an environment surrounding us all.

The position of the extension economist is both an interesting and challenging one. Our total number in Extension is increasing but we are still relatively few. Other extension specialists often think we are too theoretical and perhaps too critical of what they are doing. Some of our economist colleagues think we are not using theory enough and are too critical of the economic research results produced. We may be partially guilty on both counts, but nevertheless we must keep first things first. The growth in number and influence of extension economists, if it occurs, depends first and primarily on the results we are able to demonstrate to county workers, farmers, and marketing people.

How Does Theory Fit Into Extension Work?

Economists differ widely in their views on the usefulness of theory in solving problems. Some of the differences arise because of variations in the nature or extent of their training in economic theory; some differences arise because of variations in views as to what theories are important and useful; still other differences arise because there is no clear and general agreement as to where theory begins or ends.

There are extension economists who have received little formal training in theory. However, they are close to farmers, understand farmers' problems well and are able to make economic recommendations that are appropriate, understandable, and usable. Probably a few such economists even regard theory as a basis for dangerous preconceptions and erroneous conclusions.

There is a gradually increasing number of extension economists with

more formal training in such areas of theory as production economics and econometrics. They feel that through the systematic use of theory they are able to come to the best answers to problems. Here, too, you have extremists. They may be well trained in theory, yet handicapped for lack of sufficient contact or association with what is happening on farms or in marketing firms.

What is the meaning of theory? Webster's New Collegiate Dictionary defines theory as follows:

a. Contemplation, speculation
b. The analysis of the set of facts in their ideal relation to one another
c. The general or abstract principles of any body of facts; pure as distinguished from applied science or art; as the theory of music or of medicine
d. A more or less plausible or scientifically acceptable general principle offered to explain phenomena
e. Loosely an hypothesis, a guess

Theory, as viewed by many agricultural economists, is purely and simply a framework for thinking, which helps us: (a) to understand relationships among elements in a given situation and (b) to sift the more important elements from the less important. Here is an illustration of what can happen when you don't do this.

A nationally known dairy scientist's recommendation for years was to feed dairy cows all the good pasture and roughage they would eat, plus a carefully rationed amount of grain. This dairy scientist now reverses himself. His picture recently appeared in a national farm magazine and underneath was this comment, "The dairy feed studies all add up to, feed her all the grain she'll eat." The notion that rations might vary with changing relative prices has been either overlooked or minimized in his thinking.

In the final analysis, good researchers and good extension economists are not really arguing so much about whether or not theory should be used—both generally accept that it must be used. They are arguing more about how it should be used, the extent to which it is relevant, and how to formulate empirical studies based on sound theory that will provide usable answers.

Contributions of Theory to Problem-Solving in Extension Work

The main contribution of theory is to provide a conceptual framework and a basis for sorting out the important relationships in a given problem situation. Theory is not intended to give answers, but instead to provide a background to use in developing and thinking through concepts and analyses that give answers.

Those who conceived this program may have envisioned that I would discuss the contribution of theory in some general sort of way that would keep aloof from specific fields. However, theory is not something that produces results unless it is applied in areas such as management, marketing, or policy—subjects assigned to other extension economists on this program. My comments as to both the contributions and limitations of theory will pertain somewhat more to farm management than the other areas because this is the field of work with which I am most familiar.

1. Theory has made an excellent contribution in helping to explain what management is and what managers do. It has helped in clarifying the role of the educator or extension teacher. Although the direct usefulness of these ideas with farmers may be limited, still they are valuable in training the extension worker and in helping him to understand just what his basic role is and what his contributions should be in the learning process.

2. Theory has led extension workers to give increasing recognition to the proposition that production relations (factor-factor, factor-product, and product-product) are often curvilinear rather than linear, and that knowledge af marginal relationships among factors and products is needed in determining optimum adjustments. Extension men continually make use of the marginal idea when helping a farmer work out an order or sequence of business changes beginning with those that have the highest priority on down to those of less significance.

3. Theory was no doubt partly responsible for the oversimplification that led to treating entrepreneurs as if motivated solely by opportunities for monetary gain; more recently both extension workers and the theorists have tended to recognize other relevant motivating factors. For example, we have had some of our best farmers go out of dairying and into cattle feeding or swine production even though profits may be less. We are getting a considerable expansion in beef cow herds in Northern Michigan even though economic studies and analyses indicate that profits are negligible or non-existent.

4. The validity of theoretical propositions recently formalized under the theory of fixed assets helps us to better understand why farmers sometimes react as they do. This has been helpful in assisting farmers to think through various alternatives especially when doing farm unit work.

5. Emphasis on dynamic considerations in theory has influenced or paralleled extension thinking about risk and uncertainty. We still are not able to understand fully the unwillingness on the part of many good farmers to use credit to a greater extent.

6. Theories of money, income, and employment, plus developments in aggregative measurement techniques, plus improved micro-analyses

based on production economic theory, have all contributed to substantially improved outlook forecasts as a basis for farm management extension. Certainly there is better understanding of demand elasticities than formerly. Most would concede that fiscal policies are better understood. Deficit fiscal policies should be better understood, if for no other reason than that we are gaining lots of experience.

These are only a few examples. The Northeast Farm Management Extension Committee, in an effort to illustrate the use of certain theories or principles in management teaching, authored a publication. Some of their members report gratifying results in teaching economic principles directly to farmers. The Western Farm Management Extension Committee also authored a mimeographed publication a few years ago. Recently, I saw a preliminary draft of a book on farm management extension decisions emphasizing principles and theory. Most extension economists report at least limited satisfactory results in the use of theory and principles in their extension teaching.

Limitations of Theory for Extension Problem-Solving

Only a few contributions were listed, so likewise only a few limitations will be mentioned.

1. Economic theory has tended to assume the predominance of the profit motive with other things being equal. Extension economists find the profit motive important but also observe that there are many other motives which cause farmers to not always act like "economic men." For example, the 4-H Club program in Extension with very little economics involved is perhaps the last extension program that the majority of farm people would surrender if forced to make a choice. Another example, perhaps closer to many of us in farm management extension, is the role that a good farm account project, with its accompanying farm business analysis reports, plays in our field educational work. The business report provides us with a tool that makes it possible to call attention to profit possibilities but also permits presenting other relevant information of vital concern to the farmer.

The theorists should carefully reappraise their general attitude towards farm business analysis or farm account projects. They have been some of the most severe critics of farm account work. Much but not all of the criticism has been justified. A reliable source of current information coming in from farmers keeping some type of accounts in cooperation with the county extension agents and the university is fundamental to a good extension program in management. The account work helps keep the specialists informed, provides an excellent technique for use in training county workers in business analysis, offers great possibilities for service

or applied type research, and of course, is of direct service to the farmer cooperator. There are university administrators who concede that account projects are acceptable providing the farmers pay for them as they do for Dairy Herd Improvement work. However, the value of farm accounts lies primarily in the contribution they can make to a management education program. If the farmers pay for them, then service rather than education can become the heart of the work unless carefully guarded against.

The mail-in account project that we are conducting at Michigan State University in cooperation with 1300 farmers appears to offer good possibilities for incorporating service or applied types of research. At present, we have research efforts within the mail-in project on farm credit; family living economics; farmers' investment intentions; and feed utilization on dairy, poultry, cattle feeding, and swine farms. Researchers are directing or participating in each of these undertakings.

It would be a mistake to conclude that a management extension program could stand on an account project alone. However, a well and carefully conceived account project can compliment the fundamental and applied research efforts to provide a firm foundation for a strong extension program.

2. Economic theory has contributed little to a full understanding of the institutions that comprise the environment for agriculture. There has been little emphasis but perhaps increasing concern in theory on problems of farm tenure and credit. Very few theorists have a good concept of the legitimizing phases of the Extension Service. The theorists both in their attitude and in their teaching practically overlook an almost inviolate rule amongst extension agents—that the county worker is the key man in the extension education process. The extension economist may make excellent use of theoretical models and principles or even know a great deal about farm account results. These and other tools all help, but the extension economist must be able to build an esprit-de-corps amongst the county workers on the basis of their confidence in using the specialist's economic information. It is fundamental that the specialist be not only able and qualified to help but also willing and anxious to help when serious problems arise that the county worker must face. This perhaps is not a criticism of theory as such, but it does emphasize that unless the theory and its application can be sold it accomplishes little.

3. Economic theory tends to assume ideal output from any given input. However, in the application of the theory, extension economists find much to criticize. Cobb-Douglas studies have received wide attention. Most Cobb-Douglas studies showed low marginal returns to labor. Good farm management extension men had been focusing attention on the lack of enough business per man long before we heard of Cobb-Douglas

studies. More recently, linear programming, as an application of theory, has come in for increased attention. Magazine articles have stated that farmers would soon have only to send in certain facts; these would then be programmed and the farmer would get the results back showing him what to do. Such articles are an injustice to the method.

Farm management research workers using linear programming concede that they have problems with such things as input data, future yields, levels of management, marginality and risk. The limitations in input data coupled with the assumptions the researcher makes leads to some conclusions that are contradictory to an extension man's observation. The extension man feeling that while he is usually right, when it comes to application, but may not always be right, does watch with extreme interest developments in linear programming and other methods of theory application.

Since in practice we do not have ideal output from any given input the following are suggestions that might improve linear programming and other research efforts.

1. The University climate must encourage better research studies even if this means fewer ones. Research men might spend more time in formulating their studies and seek more help and counsel from people with field experience when making their assumptions. This will take more time but a back and forth exchange between researcher and experienced field observer will lead to improved conclusions of much greater potential benefit.

2. The administrative climate, at least in our Land-Grant institutions, must recognize that acceptance and approval of applied research findings by field educators and farmers is a research challenge and accomplishment commensurate with acceptance and approval of more fundamental and theoretical efforts by fellow researchers in other States and countries. Research studies based on the use of simple or even complete budgeting in testing alternatives, on a simple analysis of survey results, on an analysis of relatively complete records for a certain type of farming, or a study of various cost figures are examples of applied type of research efforts that are the "bread and butter" studies to the extension man.

3. Sound economic theory is sometimes tested in the form of models. With some studies neither the procedure followed or the results are directly understandable or usable either by extension men or farmers. Adjustments need to be made for more effective communication. The simplifying assumptions of theory too often tend to be carried into empirical problem-solving exercises of a highly mathematical nature. The solutions then appear unrealistic to the extension worker even though they have been reached through an elaborate theoretical-mathematical

analysis. Many of these studies are now carried to a greater degree of refinement than either the input data or potential application justifies. The first draft of a research progress report does not need to be very palatable. However, the final report if it is to receive public approval must be sound in content, interpreted well, and presented in understandable language. Researchers and extensioners are mutually responsible and obligated to see that this is done.

Theory and the Economists Involved

The theoretical-mathematical apparatus has become so involved and so fascinating that it has had a profound effect on the economists involved and the research that is conducted in Departments of Agricultural Economics. It is natural for researchers to want to work on new frontiers and apply new methods. However, extension workers need to rely heavily on proven methods, while mixing in new techniques as rapidly as they can be made useful. Thus, a rift has developed between fundamental researchers, applied researchers, and extension workers. Here are a few observations relative to the different positions held by various economists:

1. The goals of fundamental researchers, applied researchers, and extension men are different. The fundamental or theoretical researcher may be more concerned with how his results look to other theoretical researchers than with how they appear to an extension economist. This is partially associated with trying to obtain more recognition nationally and within professional circles. It may also be associated with the status of graduate programs and the attracting of quality graduate students. The extension economist, on the other hand, is more concerned about research that will provide useful information, especially to people within the State. The two positions may not be basically incompatible providing each recognizes the merits of the other. Even fundamental researchers must try to stay closer to the people. Legislators, farm people, and marketing leaders, right or wrong, are interested in findings they can understand and use.

2. The research men do most of the formal teaching. The primary focus and design is toward more theory, especially at the graduate level. This does not train or acclimate students to do a good job later in Extension. Further, field workers returning to the University for a little professional improvement, especially at the Master's Degree level, want more economics, yet the methods or approaches used in teaching economics or theory discourage them. These workers evidently feel that the cost of this learning is greater than the value they are to receive from it. The result is that they return to their jobs with little improvement in economic understanding. This places an added burden on extension econo-

mists. Sometimes overlooked is the fact that these field workers would prefer to receive their instruction formally so that they could be academically and professionally more closely associated or identified with agricultural economics.

3. The solution is not to give all extension staff members joint extension-research-teaching appointments. This might improve the formal teaching program but weaken the extension effort. The strongest economics extension programs are developed and carried out where you have a hard core of full-time, well trained, economics extension men with some type of loose but effective formal organization. Joint appointees or even full-time research men may be effectively attached to or closely affiliated with this hard-core extension group.

4. Professional improvement and position continues to be a concern of all agricultural economists. The programs of our own professional organization have been including more extension economists. Would not the association be even stronger and more popular if extension economists were given a greater voice in the formulation of policies and programs, and in the areas of awards and recognition? This will not happen automatically.

One suggestion is that a national extension committee on farm management be organized. It could be a small committee answerable to a larger advisory group. Marketing has such a committee. The committee could focus attention on the role of management in our changing times, help to formulate and clarify objectives and goals, suggest programs that should be developed and expanded, analyze the resources needed, and discuss obtaining such resources. The committee could appraise and make suggestions for increases in representation, participation, and recognition within our own professional association, within our respective regional extension committees, and even within the organization of the State extension directors—where there is no committee on management at present.

What Can We Do About It?

1. Try to attract to our field the best men possible. They must appreciate fundamental work, welcome applied efforts, and want to serve through education. There is no place in Extension for second rate agricultural economists.

2. Encourage and support professional improvement—both formal and informal. If the extension man is primarily an educator then education is what we have to offer. Every extension man should belong to his professional organization and seek greater representation, participation, and recognition within its ranks.

3. Our position is unique. We are to different people both too theo-

retical and not theoretical enough. Within the institutional organization we will not be the "best liked." However, we can gain genuine respect and have great influence.

4. The best way to gain respect is by having a strong economics extension program. Plan carefully, give identity, develop by those who must carry out the program, and put it in writing. We must obtain opinions and suggestions from both our theoretical and applied research colleagues. However, we should not look to administrators, research workers, or other extensioners to tell us what our program should be. This is our job—but with their help.

5. Encourage expansion of research programs, grounded in theory, yet applicable to current farm problems. If theory is a framework of thinking, we want more theory. We must encourage its application but reserve the right to criticize the methods of application. Some of the more popular research methods have been improved but are still far from perfection.

6. The extension economist needs more research results reported in more meaningful and understandable forms and terms. We must encourage our theoretically trained research people to interpret their analyses for extension use as well as for their colleagues in research. In the final analysis if we want more research results, we will have to take greater interest and devote more time with researchers in the formulation, conduct, and presentation of research studies.

7. Re-appraise farm business analysis or farm account work in the light of newer understanding of the theory of the firm. Much of the criticism of farm account work in the past may have been justified but there is no need to throw out the baby with the bath water. A reliable source of current information from farmers keeping some type of cooperative accounts is fundamental to a good extension program in management. We believe it offers excellent educational possibilities for training the specialist, training the country worker, and providing a framework for applied research.

8. The deviation from the more traditional account project to the use of business machines to process, classify, and report data sent in monthly is extremely popular with farmers. At the same time, this method provides for a degree of flexibility not formerly possible which holds some promise of revolutionizing research use of account data. We would not now change back in our State but we are aware that the method can be further improved.

9. We suggest a reconsideration of training and teaching programs with careful scrutiny being given the extent and applicability of the theory requirements. At present, most graduate students are required to present a thesis on research activity, but few are required to gain any

comparable experiences in either resident or extension teaching. As extension men we should take a deeper interest in our Departmental teaching programs. We are concerned because: (a) Out of the Ph.D. graduates come our future extension men and (b) The teaching program especially at the master's level directly affects our teaching burden in the field.

10. The farm management specialist and applied researcher must be confident of the contribution they are making. However, we may make recommendations that are appropriate for the farm or firm without recognizing the full implications. It seems that fundamental or theoretical studies of the macro aspects of agriculture are needed to provide us with basic information to make valid micro recommendations for the future.

When we extension economists meet a decade hence, I hope we can conclude that we saw and availed ourselves of a golden opportunity to use the latest research findings. I hope the champions of theory will then be equally strong both in extension and research thinking. By then, maybe both of us will be equally intolerant of any misuse of theory, but both will be able to attest to its indispensability and proper use in our programs.

USE OF ECONOMIC THEORY IN FARM MANAGEMENT[1]

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THE specific title assigned to this paper stimulates three questions. The first two are quite general. First, how is economic theory used? Second, how can it be used more effectively? And third, is there general use of economic theory in extension farm management work?

Let us first explore briefly this question of whether there is substantial use of economic theory. It is a query probably raised most often by our research colleagues. There is truth to their fears in the sense that we in Extension are not using and teaching the refined and mathematical approach to production economics that has come to be used in classroom teaching during the past 10 years. Admittedly, within our extension farm management fraternity a wide range exists in the extent of (1) the use or application of theory, (2) the belief as to how it should be used, and (3) the extent that there is an understanding of theory. However, these same things are probably true for research workers.

But coming more to the point, I am sure that as a general rule farm management specialists are making a constant and practical application of economic theory in their work. Economic principle is brought to bear continuously and oftentimes in such an automatic manner that there is little attention given to the theory involved since concern is concentrated on the problem at hand. Only a negligible amount of extension farm management work does not employ such principles and concepts as marginal analysis, diminishing returns, opportunity costs, fixed-variable cost interpretations, etc.

There has been a tremendous development of, and successful use of, more refined and sharper economic tools of analysis by research workers in recent years. Extension workers are eager to adapt these tools for use in solving farmers' problems. But extension farm management workers are not attempting to teach farm people how to take a second derivative or the details of linear programing. However, a number of workers are using linear programing in various ways, and considerable thought and attention has been given to studying how it might be used more widely.

One is led to the conclusion that in some instances at least, both research and extension personnel seem to have considerable difficulty in seeing the proverbial "forest for the trees" in regard to the use of economic theory in teaching farm people. It appears that the research people

[1] The author wishes to acknowledge the helpful comments and suggestions of Virgil Gilman, L. M. Vaughan, E. P. Callahan, and Raymond C. Scott of Fed. Ext. Serv.

are not looking at the same trees the extension people are seeing. It is suspected that some of our research counterparts look on many extension workers as uneducated traveling salesmen. At the same time, I am sure that we often look on our research colleagues as much too occupied with ivory-tower thoughts, and communications with each other, so that they have little understanding of real management problems of farmers.

Finding common ground for the use of economic theory is complicated by the accelerating rate of change occurring in production technology and in the institutional arrangements surrounding the production and marketing of agricultural products. These changes also result in an accelerated need and opportunity for bringing economic analysis to bear. In this kind of rapidly moving setting, it is easy to understand how individual extension and research workers may have become somewhat more isolated in their section of the forest. Considering the dizzy pace of change, perhaps extension and research workers should be highly complimented to have kept on top of the situation and maintained as much communication as they have.

Role or Function of Economic Theory

Before discussing the first two questions stated in the beginning, it seems desirable to briefly review the role of theory in decision making or what is sometimes called the management process. Primarily, economic theory *per se* serves as a tool of analysis at three points of the typical list of decision maker's actions: First, in helping define and accurately size up the problem about which a decision is being made; second (and probably by far the most important) in analyzing the expected consequences of relevant alternatives faced by the decision maker; and third, in evaluating the results of the decision. (For my own use, I like to view this evaluation of results as part of the process of analyzing alternatives pertinent to future decisions. Thus, evaluation and analysis of alternatives can be considered synonymous.)

Different Uses of Economic Theory

Farm management extension workers' use of economic theory might be classified in two general categories:

(1) As a subject, *per se,* which is taught to the farmer—at least in its more elementary aspects.

(2) As a professional tool used analytically to perform an integrating function in regard to the technical subject matter from other disciplines. Here, economics directly plays the role of assisting in the defining of problems and analyzing alternatives.

We have no difficulty in finding specific examples of both uses of theory. In fact, the use of economic theory in each of these categories has

increased greatly in recent years. This has occurred particularly through the mushrooming use of farm management schools around the country. Still we face a sizable frontier of possibilities.

Use as an Analytical Tool

As indicated earlier, economic concepts and principles are clearly and obviously used as analytical tools in most specific farm management educational activities. For example, a most excellent illustration has come to my attention of the way extension farm management specialists are currently using economics in the analysis of problems and alternatives. This is in regard to the introduction of a new type of green bean in Oregon. In analyzing this situation, Oregon farm management specialists are using economic tools to examine many facets including, the reorganization of farm operations, the possible shifting of the bean industry to other areas, the impacts on itinerant and local labor, and the economic impacts on the whole community. However, there is little need to remind ourselves how we use our stock in trade in such activities as in the interpretation of outlook information, in using farm record analysis while counseling with farm families, in the development of farm planning materials, assisting in the use and understanding of farm business arrangements, and in interregional competition analysis, etc.

More broadly speaking, there has been a growing recognition that it is not sufficient for Extension as a whole to extend simply the technical practice information related to the farm and home. If technical production information is to be soundly applied to the individually peculiar problem-situations facing farmers, such information must more than ever before be rung through the wringer of economic analysis. Included in this analysis must be a determination of the effects on non-monetary goals as well as on the heavily important monetary side.[2]

There needs to be an application of economics by all extension workers for Extension to quickly and accurately analyze the rising flood of technical information enabling farmers to understand relevant alternatives and consequences. This means that farm management specialists will have to assist other extension personnel in using the tools of economic analysis. All this adds up to the existence of an exceedingly great opportunity for and challenge to farm management extension workers to be teachers of teachers as well as true scientific practitioners.

[2] Economists and farm management extension workers are often criticized as not looking at other than the dollar and cents aspect. Compared to other educational groups which work with farm people, it is my very strong feeling that farm management workers much more accurately sense the true balance that farm people give to monetary and non-monetary ends. Similarly, they do an excellent job of considering these various ends in their analysis, but there is room for further improvement in the use of economic theory in this regard.

An example from Minnesota indicates what has been done to incorporate an economic interpretation into a typical production program. A few years ago the farm management specialists started working with the agronomists in regard to the State corn extra-yield contest. Participating farmers were permitted to carry out whatever practices they personally thought might make more money. This has been so well accepted and informative that the State contest has been renamed the "Extra Profit" Corn Contest for the past 3 years. There was strong evidence that often the extra-high yields obtained on these plots has resulted in reduced profits. This kind of demonstration undoubtedly does a very effective teaching job in regard to marginal analysis and is motivating farmers to follow profitable production practices.

However, farm management workers at the State level should primarily center their inservice teaching efforts toward the county or field staff of Extension. The existence of county or field people who are capable and confident in the use of economic tools is basic in this author's estimation for the accomplishment of any substantial amount of farm management extension work. The farm management staffs, both Extension and Research, have much at stake and much to contribute in achieving more use of economics in Extension generally.

Thus, farm management workers' use of economic theory as an analytical tool breaks into two sub-categories. The first involves their own direct use in determining economic relationships or in assisting to integrate the pertinent information on a particular problem. Second, is the continuous in-service economic training of other extension personnel so that they can satisfactorily use economic theory as an analytical tool kit. Although the latter is a task of tremendous proportions for various reasons[3] there have been great strides made in this area in recent years. A sharp increase has occured in the number of training conferences to teach extension personnel economic principles and concepts. In Virginia, for instance, the county staff working in Farm and Home Development was recently given 2½ weeks of quite formal training in production economics including classroom type examination.

The task of integrating or digesting other subject matter necessarily requires interdisciplinary working relationships. Quite commonly our analysis of an alternative is less optimistic than that of the worker in the respective subject-matter field. We can avoid this oftentimes given impression of being against everything if we can use our economic theory to assist in the development of alternatives which are practical solutions to

[3] The various reasons referred to include such things as relatively small staff of farm management personnel in most States, the relatively little formal training in economics of present extension personnel and, oftentimes, lack of understanding of the role of economics in relation to other disciplines by administration.

existing problems. By cooperatively analyzing alternatives and discovering sound courses of action, we continue to show that we can use economic theory in a positive manner. In making an analysis of a given alternative our main operating tool is some form of a budgeting procedure. With the use of economic principles and good judgement telling us what to incorporate in our budgets, we have found no better way of demonstrating to other professional workers, as well as to farmers, the effectiveness of our findings in helping obtain the sound solution of problems.

Teaching Economic Principles Directly to Farm People

Recently farm management workers have considerably stepped up interest and activity in the teaching of economic principles directly to farm people. Much of this teaching has been carried out in concentrated workshop situations. Correspondingly, materials have been developed for teaching in a simple form such basic concepts as diminishing returns, maximum profit point, equi-marginal principle, least cost input combinations, fixed cost variable cost determination, and some aspects of risk and probability. However, materials of this nature, which can be used directly with farm people, have been slow in coming. They are probably in general at a level below what is taught in undergraduate farm management courses. In fact, we in extension farm management have felt that our biggest accomplishment along this line was made in the past 3 years, by the Northeast and the Southern Farm Management Extension Committees with the publication of bulletins which serve as guides in teaching principles. Even these publications were intended more for use in teaching principles to county personnel rather than to be used directly with farm people.

This upturn in interest and activity in regard to teaching principles stems in part from the concern about the service versus education direction of Extension work. Shifting to more emphasis on teaching principles *is* consistent with the educational objectives of Extension. While there is considerable room for expansion of this form of educational work, we should be aware of some limitations and reasons for caution. Farm people are not particularly interested in learning economic principles, *per se*, and thus little openly expressed demand is made for such educational service. On the other hand, in the right situation and with teaching skills, we can do a lot of teaching of principles. In most instances attempts to teach principles are built around case examples similar to decision-making situations faced by the student farmer. Through such approaches, interest in learning principles is cultivated.

Undoubtedly there has been much teaching of economics in an implicit and perhaps an unconscious way through providing farmers with information giving an economic analysis pertinent to a specific problem. This particularly happens in individual counseling when an extension worker

is attempting to help make a farm plan, or budget out some phase of an operation. Frequently there is a strong tendency for both the extension worker and the farmer to become so involved with deciding on a course of action that there is often little or no conscious recognition of the economic principles they are using.[4] Thus, a more conscious realization on the part of the extension worker of the opportunities he has to teach economics would enable us to capitalize on the potential possibilities of teaching economics directly to farm people.

But, the strong open demand is for information which has already been put through the digestion process of economic analysis and applies to a current specific problem upon which a decision needs to be made. This is especially true at such times as during the sign-up period of the 1961 Feed Grain Program, or when weather conditions result in such things as drought or wet corn, or when new technology or innovations get wide publicity such as was the case with vertical integration. Results obtained in these types of situations are tangible and get recognition for farm management work. We have and can make significant accomplishments along these lines. A big part of our work will always be in assisting to solve these urgent as well as continuous major management problems. But the teaching of economic principles seems likely to have a highly complementary effect on the demand by individual farmers for assistance in analyzing their problems.

It does not necessarily follow, however, that accomplishments in teaching economics per se, and improving management ability will always remain so relatively unrecognized and thus have relatively low priority assigned to such work. Our administrators and legislators would have a much deeper and more permanent impression of farm management accomplishments if farm people were to start looking openly to Extension for help in improving management know-how and ability. Extension itself would be looked upon as a truly objective educational organization. Such an attitude by farm people may be just around the corner if the concentrated effort in farm management work at the county level, which is occurring in a few States, is allowed to continue to grow, and if other States follow suit. As indicated earlier, these county staffs will need to be sufficiently trained in economic theory, and they will have to explicitly use their opportunities for teaching principles for this change to occur in what the public wants from Extension

Let us turn back for a moment to the relationship problems with our research counterparts concerning the use of theory in farm management extension. If extension and research are to complement each other as they

[4] The extension worker, due to his experience and knowledge, often sees an alternative which probably is by far the best one. The extension worker then oftentimes proceeds to try to *sell* the farmer on this alternative.

should and can, it behooves each group to make an all-out effort to work together sufficiently enough to permit communication. Researchers have a vested interest in making adaptations of research so that they will be meaningful to practical and hardheaded businessmen farmers. The assumption is often made that extension economists should have competence comparable with research people in knowledge of economic theory plus the ability to communicate results of its use to motivate real world changes. In my opinion, this is a realistic assumption.

It is mainly an extension job to translate results of research into terms which enable effective application to farmers' problems. Also, well-trained farm management extension specialists in most cases are uniquely qualified for this function. With their continuous close feel of the operating conditions on farms, and with their intimate understanding of the farmer's language, they are in an excellent position to play an interpreter role in regard to all production research as well as economic research. Progress is being made, as evidenced by the increasing tendency to team up with research workers, to prepare materials and extension bulletins.

In this discussion we have been led to the defining of new or the broadening of old responsibilities. With the apparent limit of resources that is committed to farm management extension now, or is likely to be committed in the near future, perhaps a very urgent application of our science in determining our work priorities is needed. It is predicted that such self-examination will result in emphasizing those activities which provide opportunities to explicitly teach economic principles as real problems are tackled.

Thus, there seems to be a basis for concluding that not only is there a vast challenge for extension farm management, but an opportunity for being the catalysts that make themselves and all extension significantly more productive.

USE OF ECONOMIC THEORY IN MARKETING

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PERHAPS the easiest kind of mistake to make on the general subject of applying economics in agricultural Extension is to belabor points of general agreement. For example, it seems safe to assume that agricultural economists generally are agreed that economic theory can and should be put to more effective use in extension programs. If this is the case, it should be unnecessary to argue the merits of more solid theoretical content in marketing extension work.

Agricultural economists are agreed that "economic illiteracy" contributes to prevailing misconceptions like dictating the prices of farm products to packers and processors, controlling the farmer's share of the consumer's food dollar, and advertising to free the market of agricultural surpluses. The profession recognizes that farmers and organized farm groups need to understand economic concepts and relationships to plan marketing programs wisely. Economists see the application of production theory to the internal decisions of businesses in the agricultural marketing and farm supply sectors of the economy. Most would agree that the extension economist has a responsibility to build economic understanding with the audiences he serves and to use sound economic analysis when counselling on marketing programs. On these premises, the major question is *how* can more effective use be made of economic theory in on-going extension marketing programs.

To direct attention to the "how" question for extension marketing, the use of economic theory can be broken down into (1) teaching economics to extension audiences, and (2) using economic theory for analyzing marketing problems. Dr. Lanpher has made this same distinction for extension farm management programs. Within the first of these a further distinction is important for marketing. This is the distinction between teaching economics to build an understanding of markets and market behavior and teaching economics to assist marketing agencies to make more effective business decisions. In both types of teaching, the economic theory must be interwoven with application for the extension audience.

Teaching Theory With Application

Perhaps the greatest difference between teaching economic theory to an extension audience and teaching economic theory in the university classroom or to research assistants is the importance of teaching application with the theory. Extension audiences are almost entirely problem

oriented; they have no direct interest in the subject matter discipline except as it is related to the problems at hand. The attention of the extension audience can be held only by relating the material presented to these problems. Academic curiosity, credits toward graduation, and research ambition play no part in the motivation of extension audiences to learn economic theory.

Interest in felt problems can be a strong motivation to learn economics if the audience sees the application. If the extension marketing economist can develop the application to the immediate problem, step by step, as he develops the economic concepts relevant to the problem, his extension audience, if keenly interested in the problem, will follow him with interest —even with awe and amazement. But if the direct application to the problem is lost at any step along the way, all the clever visual aids available will not maintain interest in the theory.

The importance of teaching the application of economics to the problem every step of the way applies whatever the extension media used. If the application is not pointed out in press releases, articles or extension publications, readership will be lost and no economic understanding gained. If it is not done in talks, even those who listen will not follow closely enough to develop an understanding of the economic concepts presented. Even the workshop approach—in many ways the most effective media for teaching economic concepts related to marketing problems—will fail unless the theory is carefully applied to the immediate problems. Those that attend will feel that the workshop has not been a profitable use of time, and at best will have only a passive interest in the economic concepts presented.

While no general rule is known to the author on how to make the application of the economic concepts as they are presented, the prerequisites for doing so are fairly clear. The extension economist himself must understand the economic concepts thoroughly, so that he sees the limitations as well as the practicability in their application. He needs to be conscious of the importance of keeping uppermost in his presentation the relationship between the concepts and the problems. He must convey enthusiasm in the concepts because they apply to the problem and contribute to its solution, rather in the concepts for their own sake. And he must keep the concepts he presents simple and clear, avoiding unnecessary refinement and elaboration for the specific purpose at hand.

Teaching for an Understanding of Price Theory

Perhaps one of the greatest needs in agricultural marketing is to develop a general understanding of elementary market price theory. Farmers and farmer leaders commonly lack this understanding, and many county agents would profit from a more thorough knowledge of the price making process. Sometimes cooperative managers and directors, market-

ing firm officers, and trade association officials do not have the depth of understanding of price theory that they need in their positions.

A general understanding of price theory is not an end in itself. But it can eliminate misconceptions and action programs based on misconceptions. It can lead to more effective marketing by individual farmers. It can lead to more efficient marketing, processing, and distribution by marketing agencies. It can lead to more constructive and effective marketing programs through organized action by groups of farmers. And an improved understanding of price theory can lead to more effective agricultural policy at the State and national levels.

Extension audiences will not go along with an abstract discussion of price determination based on such things as the concept of supply and demand, price and income elasticity, cross elasticity, derived demand, market structure, and differentiated products. But if these concepts are developed for a group of turkey producers facing sharply declining prices and applied specifically to their problem, the audience probably will be very receptive to learning some of the elements of basic price theory. The same would be true of a group of apple producers thinking of organizing a bargaining association, a group of fertilizer dealers concerned about booking prices on fertilizer, or any other extension audience with an immediate problem to which an understanding of price theory is basic.

In making the application of relevant economic concepts to a problem of this sort, the extension marketing economist will naturally need to present empirical content as well as the economic concepts. But unless he develops the theoretical concepts as well as the empirical content, he is not doing effective extension teaching; he is not giving his audiences the necessary understanding so that they can make their own decisions and solve their own problems.

An understanding of basic price theory applies to many different marketing problems faced directly by farmers, regardless of the commodity involved. Because of this, the extension marketing economists working in different commodity fields in a State sometimes find it helpful to team up to prepare materials and present programs on the basic price theory with its application to different marketing problems. The preparation a few years ago of the cartoon-illustrated price theory primer by the extension marketing staff at Oregon and its use in a State-wide program is a good example. Another example is represented by the 2 or 3-day marketing workshops at the county level now being used in a number of States.

Teaching Production Theory to Marketing Agencies

Just as Lanpher has pointed out for extension work in farm management, there is much opportunity for direct application of concepts in production theory in extension work directed to the management of busi-

nesses marketing farm products and distributing farm supplies. But as has been emphasized above, there is little opportunity to teach economic theory for the sake of theory. The busy businessman in the agricultural industries does not have time for this. But he is willing and even anxious to learn economic concepts for which he sees the direct application to the problems of his business.

Managers, directors, and owners of farmer cooperatives and other businesses serving agriculture routinely face problems and make decisions for which production theory has direct application. They must decide the product mix—the combination of goods and services for the business. They must decide pricing and margin policies for each good and service offered. They must decide the full pattern of nonprice offers. They must decide among an infinite number of capital, labor, and other input combinations. They must determine the goals for the business in terms of rate of growth, ultimate size, and basic organizational structure. They are faced with constantly changing technology, shifting demand and supply conditions, and external institutional factors affecting operations. In short, just as the science of economics deals with choices between competing alternatives, so management of businesses serving agriculture must select among many competing alternatives to accomplish desired objectives.

In Iowa as in many other States, much of the teaching of production theory to managers and key employees of businesses serving agriculture is done in formalized short courses and workshops varying in length from 2 days to a week. Some of these are built around one of the major management functions like long range planning, organization for effective management or evaluation and control. Some are conducted on a classroom basis with a number of organized courses extending through the period of the short course. The courses are in charge of a single instructor and include home assignments and final examinations. Others are conducted on a workshop basis with much of the instruction accomplished by the participants working through worksheets for a case problem in small work groups. Various budgeting techniques are used extensively in this approach.

The concepts of production theory are not taught *per se* at the short-courses, but are an integral part of teaching on how to solve the problems faced by managers. Two examples of short courses held in Iowa in 1961 may help clarify how the theory is presented. The theme of the Manager's Workshop for Elevator and Farm Supply Businesses was "Management looks at 1966." The major areas covered included (1) setting goals and targets, (2) projecting potential markets, (3) analyzing competition and projecting margins, (4) planning facilities needed, (5) planning personnel and organizational needs, (6) building a financial plan, and (7)

putting the long range plan into operation. The courses taught at the week's shortcourse for assistant managers of elevator and farm supply businesses included (1) how to manage credit, (2) how to use records in your business, (3) how to merchandize effectively, (4) how to develop good employee relations, (5) how to organize for effective management, and (6) how to get and keep customers.

The development of areas such as these in the short courses involves the application of many of the concepts of modern production theory. Such concepts as technical and market rates of substitution between inputs and outputs, including interdependence among them, discounting for both time and uncertainty, relationships between fixed and variable costs, and substitution rates between price and nonprice offers have been presented in application to the problems of management. Conditions for production equilibrium, in terms of both marginal analysis and programming models, have been presented in a simplified and applied form, generally in terms of specific empirical content. Experience has indicated that the more specific and direct the application of the theoretical concepts to the internal firm problems faced by managers, the more successful the short-course presentation of the concepts. Also substituting terminology regularly used by managers for professional terminology helps considerably in communicating the economic concepts.

Using Theory for Problem Analysis

Extension economists in marketing have many opportunities to make full use of economic theory in analyzing actual marketing problems and making recommendations to those confronted with the problem. And in making the recommendations they have the opportunity and obligation to present as supporting evidence the economic analysis and logic used to arrive at the recommendation. Over the long pull, this may be a more important and effective use of economic theory in extension marketing programs than the direct teaching of economic concepts to extension audiences.

The extension economist regularly is called upon to render professional advice to marketing firms, farmer cooperatives, bargaining associations, trade associations, administrators of marketing orders, state marketing boards, and other action groups concerned with marketing problems. This advice is usually requested at the point of action so that the specialist's professional training and background is brought to bear directly and immediately. Often it must be based largely on theoretical logic because of time limits which preclude empirical analysis.

Secondly, the extension marketing economist is called upon to help set up and organize various kinds of studies by those actually involved in marketing. These extend all the way from local market surveys to full

blown operations research studies by regional or national marketing organizations. In either case, the specialist's competence in economic theory and his ability to bring it to bear on the specific problem confronted have a direct bearing on the value of the study and ultimately on the action program based on the study.

Finally, many extension marketing economists themselves design, organize, and supervise applied studies of specific marketing problems, ranging from contemplated mergers of two or more marketing firms to broad questions of market organization and structure. Such studies draw heavily on the specialist's training in economic theory as well as procedures for quantative economic measurement. Consequently, the applied studies by the extension marketing economist represent another important use of economic theory in extension marketing programs.

The degree of success in any of the three uses for theory in extension marketing programs depends directly upon the competence of the specialist as a professional agricultural economist. In many States the extension administration recognizes this and requires professional standards fully as high as for their counterparts in research or teaching for hiring extension marketing economists. Unless this is done, it is impossible to make the full use of economic theory in extension marketing programs.

USE OF ECONOMIC THEORY IN PUBLIC AFFAIRS EXTENSION WORK

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THIS paper will deal primarily with the use of economic theory in conducting educational work in public affairs. Since educational work in public affairs is a relatively new field of extension education, it seems desirable to identify first what public affairs education is, and second what responsibility Extension has in this area of work. This is not to say that public affairs educational work has not existed in the past. It has. But the specific subject matter area has only been identified as such within the last 10 to 12 years. In 1949, a group of extension directors, representatives of the Farm Foundation, and others met in Washington, D.C., for the purpose of outlining broad objectives in this field. These objectives were to develop in individuals:

1. An active interest in public affairs problems.
2. An understanding of the issues and principles involved.
3. The ability to make judgements on the basis of a critical examination of the evidence and logical thinking.
4. A desire to participate effectively in the solution of problems.

Public Affairs Education

Public affairs education involves more issues than just agricultural policy; for example, taxation, education and schools, national economic growth, adjustment problems created by economic progress, forms of government, national defense, foreign aid, development and conservation of soil and water resources, interdependence of agriculture and other segments of our economy, area development of resources; all are critical issues today.

Pehaps the best way to define public affairs extension work is to briefly review the development and recognition of this educational work within recent years.

The Scope Report states "Extension programs grow out of the expressed wants and carefully analyzed needs of local people. The increasingly complex interdependence of agriculture and other segments of our economy is causing rural people to have a greater and more definitive concern with public affairs issues that bear directly upon their welfare. They are turning to the Extension Service as a readily available informal

[1] The author wishes to express his appreciation to colleagues at N.C. State College for their valuable suggestions.

educational service for help in acquiring facts and for methods of analyzing and appraising such facts. Thus they may exercise their responsibilities as citizens in a better-informed way."[2] Since the beginning of extension work, rural people have faced many controversial public problems. However, it was not until after World War II and the early 50's that the Extension Service specifically identified the area of public affairs education and assigned personnel to work in this area. Perhaps the reason Extension did not identify and assign personnel earlier was due to (1) the lack of properly trained personnel, (2) lack of demand or need for educational assistance in this area, and (3) controversial nature of public policy problems.

Public affairs education has evolved with the growing complexity of problems of concern to the public interest and welfare. There are now many local, State, and national programs and problems which must be understood by the populace. As world conditions become more complex, as economic change and growth accelerate, as resources become limited, and as the interdependence and relationships between the industrial and agricultural sectors change, the need for education in public affairs has increased. There will be a new and growing demand for education in public affairs in the future.

Representative Government requires an informed citizenry if it is to meet its needs. If given relevant facts, and methods for their analysis, citizens then have a better basis for making intelligent decisions.

People from all segments of our society are concerned about public policy issues. There is a desire to understand public issues, their effect and the implications of issues on their individual and group welfare. Public policy problems not only affect the decision and management of an individual's resources, but also that of an entire community, area, and the total economy.

The committee statement of responsibilities in the Scope Report states the objectives of public affairs education—"The primary basis of an educational program in public affairs is to provide an educational experience that will stimulate changes in knowledge, attitudes, and skills. Education should provide a basis for individuals to make decisions based on an intelligent interpretation of facts."[3]

Education in public affairs requires more than a mere presentation of factual information. It must be concerned with principles related to the analysis of facts. Public affairs education must include the ways and means of analyzing facts and opinions in the consideration of various alternatives. The role of the Extension worker in public affairs education

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[2] *A Statement of Scope and Responsibility—The Cooperative Extension Service Today,* Subcommittee on Scope and Responsibility, Extension Committee on Programs and Policies, 1958.

[3] *Ibid.*

is to point out the economic and social consequences of alternative courses of action. We should help with a logical analysis so that people may make a decision consistent with their own values. It is the function of people, individually and collectively, to arrive at their own answers and solutions, and to build policies to bring about solutions. Extension has an obligation to provide the facts and the analysis of information for organized groups and individuals to use in making their own decisions.

Economic Theory and the Task of Interpretation

The purpose of any analytical treatment of a public affairs issue is to provide a body of principles according to which pertinent facts can be selected and interpreted.

There are innumerable facts and conditions about every public affairs issue. The economist in developing an economic analysis of a program or issue must be able to separate the relevant from the irrelevant facts. However, he must remember he is dealing with selected facts. There are always other facts relating to an issue which interest other people and other disciplines.

Boulding states—"it is only theory—i.e., a body of principles—which enable us to approach the bewildering complexity and chaos of fact, select the facts significant for our purposes, and interpret that significance. Theories without fact may be barren but facts without theories are meaningless. Facts are relevant only in relation to some body of principles."[4]

Most public affairs issues are of a broad nature. Seldom, if ever, is economic theory and analysis, by itself, the only body of principles needed to test and develop alternative approaches to public affairs issues. Economic, social, and political theories are usually needed in the development and analysis of public affairs issues.

Public affairs educational work draws on two primary bodies of economic theory—macro economic theory and micro economic theory. Although not complete by any means, the following listing points out the main areas and use of economic principles in public affairs work.

I. Micro-theory

A. Used to analyze the expected effects of alternative farm policy on the individual farm firm, for example, the recent feed grain legislation.

B. Used to create an awareness of changes needed in farm policy and legislation.

C. Used to aid individual decision-making in farm, home, and business units.

D. Create an awareness of each individual's responsibility in a democratic society.

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[4] Boulding, Kenneth E., *"Economic Analysis,"* New York, Harper and Brothers Publishers, 1941, p. 5.

II. Macro-theory

A. Used to create awareness of the necessity for and the types of resource adjustments in agriculture, for example, aggregate demand and supply analysis, alternative returns to resources in their present and potential use.

B. Used to teach the scope of agriculture, its relationship to other segments of the economy, and the benefits of an efficient agriculture to other segments of the economy. For example, the agribusiness concept and the benefits to consumers and labor force of the importance of agricultural efficiency to other segments of our economy.

C. Used to teach the principles of international trade and value of international understanding and relationship.

D. Useful in community and area resource use and development, for example, the effect of alternative resource use in economic area development.

E. Welfare economics.

F. Monetary and fiscal policies.

G. National income growth and development.

Economic theory is the most important tool of the public affairs specialist. In most cases, we are forced to rely upon economic theory in developing an analysis of existing policies and programs and alternative policies and programs. Economic theory helps to organize our thinking and to analyze the consequences under a prescribed set of conditions. Economic theory furnishes the framework and method and procedures to use in analyzing an existing policy and in developing the analysis of an alternative policy. This gives a basis for making intelligent judgements for changing existing policies and programs and for comparing new or alternative proposals with existing policies and programs.

The forward-looking and alert public affairs educational programs must

(1) analyze present and existing policies and programs,

(2) test and superimpose new conditions and alternative proposals,

(3) trace logical consequences of new conditions and alternative proposals, and

(4) summarize consequences and conclusions of alternative proposals.

The above processes cannot be accomplished without the use of economic theory.

Limitation of Economics in Public Affairs Work

It must be recognized that economic theory and economic analysis by itself can not provide the ultimate answer to what is right or wrong about public policy issues. Furthermore, economic analysis furnishes no automatic formula by which a proposal or alternative for the betterment of mankind or a nation can be tested. For example, the economist can use

economic analysis in appraising alternative approaches; however, it is not his purpose to decide which one of these approaches to select or apply. Neither is it his business to decide whether the school lunch program should or should not be expanded with surplus farm commodities or larger quantities of surplus agricultural products used for economic development of friendly nations, or for the stockpiling of strategic materials. It is the business of the economist in public affairs work to analyze in the best possible manner those values which can be measured in numerical terms. In all political and public policy questions, such imponderable realities as friendship, patriotism, etc. are of vital importance. Economic analysis must recognize these imponderables. Many times the economic analysis is affected by the imponderable values as much as, or even more than, the quantitative values.

The economist in public affairs work studies the choices. He does not judge them, except in view of some stated goals or objectives. His main responsibility is to point out to the public the nature and consequences of a particular choice, particularly the quantitative and qualitative results. The choice rests with a group or public opinion.

Interdisciplinary Nature of Public Affairs Work

Many specialists other than economists are needed to provide relevant facts and analysis of public affairs issues. As Samuelson states "Thus, psychology (the study of mental behavior), sociology (the study of group behavior), anthropology (the study of human races and cultures) and even physiology (the biological study of how organisms function) might cast light on *what* people want in the way of goods and services; why men sometimes like nourishing food, sometimes do not, why people often seem to find it as necessary to have a shiny automobile as a wife or a baby, and so forth."[5] Many other disciplines are needed to adequately provide analysis for public affairs work. Today, the physical sciences and engineering are needed to help determine how resources are transformed into the output of goods and services. The desirable distribution of wealth and income among individuals, groups, and nations and the determination of tastes, ethics, etc. are aspects of public affairs work that cannot be determined by the economist. The definition and determination of social ends must be left to the philosopher, the theologian, the statesman and finally to public opinion.

The public affairs economist can play a very positive role of *describing, analyzing, and understanding the processes* that take place within our present day economy. He can play a vital role in the *appraisal* of alternative proposals by which a group or community attempts to mobilize its means and resources to achieve some prescribed ends.

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[5] Samuelson, Paul A., *Economics, An Introductory Analysis*, McGraw Hill Book Co., Inc., 1951.

In general, it can be stated that public policy issues or problems are concerned with the use of adjustment of some resource which affects the public welfare and interest. The scope of public affairs education is determined by the education and understanding people need in order to participate in any public policy decision involving technological knowledge together with limited resources. Often times, this means the gaining of a better understanding and application of basic economic principles on the part of individuals or groups.

Intelligent decisions on public policy issues require knowledge from many disciplines. Economics, politics, and sociology are almost always involved in a public policy issue. The interrelationship between these three disciplines must be recognized and connected with technical knowledge from other disciplines, depending upon the nature of the issue at hand. In recent years extension workers in public affairs education have pointed out the limitations of economic theory in conducting public affairs educational work. Professor J. Carroll Bottum of Purdue University says that the economist must be able to separate clearly the part that economics and noneconomic values play in solving public problems. People's decisions, opinions, or judgment concerning public problems are based on their beliefs and their values. In expressing their opinions people express both their beliefs and their values at the same time. Usually they do not distinguish between what they think they know and what they like or dislike. Nevertheless, this is the basis of decisions in the public policy area. In our educational process we must recognize the basis of their judgment and be prepared to treat each of them properly because they require different approaches. The public policy worker is beyond his field when he attempts to change these values for individuals except insofar as a cleaner understanding of economic concepts may influence the individual's values.[6] There are definite shortcomings in the use of economic theory and analysis alone in public affairs education.

Mr. Bottum makes another very important point regarding public affairs education work. "There are two distinct functions in policy—(1) decision making and (2) action to get decisions carried out. Education can make the major contribution to the decision-making area. It is largely the function of pressure organizations to rally the people around certain policies to obtain action."[7]

Economic Analysis and the Educational Approach

In recent years "the educational approach" has become identified as the best way by which extension educational work might be conducted. Traditional methods of economic analysis along with the use of the educational approach appear to be the best designed procedures for con-

[6] Jaccard, C. R., *The Development of Public Affairs Education in The Extension Service*, Fed. Ext. Serv., 1958.

[7] *Ibid.*

ducting public affairs education work. Dorner, in the August 1955 *Journal of Farm Economics,* concisely states the use of the educational approach in the development of an extension philosophy for working intensively with individual farm and home families. The educational approach assumes that no one is better equipped to make decisions given the proper understanding of relevant ideas and information than the people most closely and directly affected by the results of those decisions. The real job of education then is *to acquaint* people with the ideas and concepts relevant to making an analysis of their problems and to provide them with the information needed to anticipate the consequences of alternative ways of solving their problems.[8]

With the recent emphasis being given to the agricultural adjustment problems and policies by the Center for Agricultural and Economic Adjustment at Iowa State University, and the Agricultural Policy Institute at North Carolina State College, the educational programs of these two efforts focus considerable attention upon what is becoming to be labeled the "educational approach." Certainly, in the estimation of future adjustments and the projection of trends in agriculture, the same approaches and procedures of economic analysis may be used that have been followed for years by agricultural economists. However, when the stage is reached of considering how the adjustment can be accomplished or brought about, "then a new or different educational approach is required if the institution is to remain in an educational role. Therefore, the educators' approach should be—

(1) to analyze the problem,

(2) to set forth the possible solutions,

(3) to appraise the consequences of each of the solutions as objectively as possible and

(4) to allow each individual or group to choose which course of action best meets their values and over-all goals.

People make their decisions in the policy area on the basis of facts, what they think are facts, and upon personal values. The less facts they have available, the more they rely upon their values and beliefs, which are largely the results of their cultural, religious, and economic background. The function of the educator is to provide the facts, identify, and clarify the values involved, and provide the framework so that the individual may make his own decisions more on the basis of facts, logical thinking, and his own set of values. This may involve calling his attention to the conflict among his values and helping develop possibilities for resolving them."[9]

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[8] Dorner, Peter A., "An Extension Philosophy for Farm and Home Development," *J. Farm. Econ.,* Vol. XXXVII, Aug., 1955.

[9] "Gearing Extension for the Task," a section in *Agricultural Adjustment: A Challenge and Opportunity for Land-Grant Colleges,* Center for Agricultural and Economic Adjustment, Iowa State Univ., May 1960.

The educational approach is certainly a different approach than has been used by Extension in the past. The traditional approach has been to give the individual or group a more specific answer. The educational approach is certainly necessary for conducting educational work in the public affairs and policy area. Research work must precede and serve as the basis for the use of the educational approach on public affairs problems.

The development of fact sheets and the basic procedures of the self-administered discussion groups, as have been used in Iowa, Cornell, Ark. and other States recently, certainly is a technique that deserves a closer look as an educational procedure for conducting public affairs education work and for developing educational leadership.

One of the best jobs in the preparation of subject matter material in public affairs in recent years was the collaboration of the Farm Foundation, National Committee on Agricultural Policy, Federal Extension Service and the various State Agricultural Extension Services in the development and preparation of the series of discussion leaflets entitled "The Farm Problem—What are the Choices?" Here, all of the major approaches to the farm problem were pulled together and analyzed in a similar manner as to the economic and social consequences of the particular approach. It required considerable resources to accomplish the job, however, I personally feel it has been one of the best uses of the traditional methods of economic analysis plus the educational approach in public affairs educational work in recent years. This material served to equip people, groups, and organizations with an analysis of alternative approaches which can serve as a base for more satisfying decisions.

Summary

We must rely upon economic theory in conducting public affairs educational work. Economic theory and analysis cannot be relied upon as the sole basis for conducting educational work in public affairs. People's goals and objectives are not always economic, neither are the goals and objectives of pressure groups and organizations. Most public affairs problems and issues appear to be a combination of economic, social, and political goals. Likewise, economic, social, and political theories and analysis must be used in analyzing the various alternatives and consequences of public affairs problems. The traditional methods of economic analysis along with "educational approach" appear to offer the best way of conducting educational work in public affairs and policy. In the future public affairs educational work will become of increasing importance in extension programs.

AN APPRAISAL OF THE RURAL DEVELOPMENT PROGRAM: THE FIRST SIX YEARS

CHAIRMAN: HAROLD F. BREIMYER, AGRICULTURAL MARKETING SERVICE

RURAL DEVELOPMENT ACHIEVEMENTS AND SHORTCOMINGS AS SEEN AT THE FEDERAL LEVEL

DON PAARLBERG
Purdue University

MY INTEREST in the Rural Development Program is direct, deep, and of long standing.

On January 11, 1954, President Eisenhower asked Secretary of Agriculture Benson to "give special attention to the problems peculiar to small farmers." The driving force behind the President's interest, incidentally, was the Undersecretary of Agriculture, True D. Morse, who, more than any other person, deserves to be called the originator of the Rural Development Program. As an assistant to Secretary Benson, it became my responsibility to head the task force which made the study requested by the President. This study, reported in an agriculture bulletin issued in April 1955 and entitled, *Development of Agriculture's Human Resources,* became the basis of the Rural Development Program.

I shall not describe the Rural Development Program to you who know it well; but let me repeat the words used by President Eisenhower on April 27, 1955, in his Special Message to the Congress:

> We must open wider the doors of opportunity to our million and a half farm families with extremely low incomes—for their own well-being and for the good of our country and all our people.

The major philosophy of the Rural Development Program has been to help rural people move toward the goals to which they themselves aspire. The theory has been that if doors of opportunity are opened, both in the farm and the non-farm sectors, the rural people themselves, particularly the young people, will wisely choose the opportunities to which they are best suited. Literally, the purpose is the development of agriculture's human resources.

Since the Rural Development Program, now the Rural Areas Development Program, has been in existence for 6 years, an appraisal is in order. My assignment is to give such an appraisal from the Federal level, where I served throughout the entire life of the program, though not with direct responsibility for it, until January of this year. As in my assignment, so in my paper, I shall divide this appraisal into two parts, Achievements and Shortcomings.

Achievements

The first achievement, and by far the most important, is that the Rural Development Program brought into the open and achieved better understanding of a group of problems that had previously been glossed over. I shall enumerate four of these:

1. *The existence of rural poverty.* One measure of economic well-being is family income, and families with less than $2,000 income are often considered to be in the low-income bracket. On that basis, our farm families, while comprising only 8.4 percent of the population, comprise 22.7 percent of the nation's low-income families. The incidence of low-income among those defined as farmers by the census is thus almost three times as great, relatively, as that of the population generally. For many years, pride or ignorance or apathy, or all three, kept the public from recognizing this serious problem. Poverty scattered over the countryside is not so dramatic as poverty concentrated in an urban slum. Now, largely as a result of the educational work of the Rural Development Program, it is possible to be heard and to be believed when one speaks of rural poverty.

2. *Poor utilization of human resources.* The rural poor neither share fully in our economic and social progress nor contribute as much as they would like and could contribute to the Nation's production of goods and services. Secretary Freeman recently said, "The amount of underemployment among agricultural workers is presently equivalent to 1,400,000 man-years of unemployment." There is a growing awareness that in our rural regions we have a form of disguised unemployment for a million and a half people. Realization is growing that we should be seriously concerned about human resources of this magnitude inadequately used.

3. *The failure of price-support programs to help the small operator.* The fiction was long maintained that the major purpose of price-support programs was to help the low-income farmer. The million and a half low-income farmers have long served the statistical function of adding much to the denominator and little to the numerator in the determination of per capita farm income. Their existence thus helps produce a low per capita farm income figure and thereby helps to rationalize farm programs intended to increase overall farm income. Little attention is paid to the fact that the resulting programs do almost nothing for low-income farmers whose needs they are alleged to serve. The farm policy focus and the outflow of Federal money are excessively concentrated on large operators for whom incomes were already well above average. Now it is increasingly recognized that price-support programs put very few dollars into the pockets of the low-income farmers and in fact serve to widen the income disparity within agriculture.

4. *Limited opportunities to operate farms.* From time immemorial, the

blithe assumption was made that farming offered an opportunity to every farm-reared young man and woman. Now the people are beginning to recognize that we are in an agricultural revolution, that the rural birth rate is high and that large-scale off-farm migration is a necessary consequence of these facts. The Rural Development Program is the first program which officially recognized, at the Federal level, that only a minor fraction of the farm-reared youth can find their future in farm production.

Until these problems are understood they cannot be solved, and until they can be discussed dispassionately, they cannot be understood.

Understanding of the low-income problem in agriculture is by no means complete. But it is growing. This, as I said at the outset, is the chief accomplishment of the program. If nothing else had been accomplished, this educational achievement alone would easily justify the effort put into the Rural Development Program.

But this is not the sole accomplishment. Actual and tangible improvements have been made.

The following specifics taken from reports submitted by State Rural Development Committees describe program accomplishments during the year 1960:

Industrial growth, new business, and service industries have added nearly 18,000 full or part-time jobs. A 6-county Rural Development Area in Missouri added 1,300 jobs.

About 7,000 small and low-income farms benefited from new crops and increased crop production through the Rural Development Program in 1960.

There were 130 major projects to promote better forest management. Twenty-six States reported soil mapping completed on 8,660 farms. Eighty-one counties reported "stay in school" campaigns. Thirteen States undertook projects in 1960 to improve vocational skills for young adults.

Five hundred and seventeen health projects were reported, including hospital building, community sanitation and educational work. In Crawford County, Ind., 300 people volunteered their help in a county-wide health study.

The Small Business Administration loaned $30 million to business firms in the low-income area.

One can apply his own discount factor to these reports. Those of us who have made Government reports, and this includes most of us, will have a basis for doing so! One can say that many of these things would have happened without the Rural Development Program, as indeed they would.

But after all these discounts, whatever they may be, considerable substance remains. In many programs areas, a general feeling that nothing

can be done about economic ills has been replaced by a new awareness of community resources and a belief that living conditions can be bettered.

Shortcomings

Now I must mention shortcomings of the program. Though outweighed by achievements, they nevertheless merit our attention. What I shall say about shortcomings has been said before. I have said these things myself, both while I was within the councils where policies were being determined and since returning to academic life.

My assignment is to evaluate achievements and shortcomings as seen at the Federal level. I therefore will concentrate on that part of the program, leaving an appraisal of operations at the State and local levels to Mr. Sheppard and Mr. Pettyjohn.

The major shortcoming, in my judgment, is that the program has been too small. It has failed to grow properly.

The dimensions of the program are difficult to measure. The budgetary practice of the Department of Agriculture has been to make expenditures and operations of the Rural Development Program an unidentified part of the programs of the Extension Service, the Agricultural Research Service, the Agricultural Marketing Service, the Farmers Home Administration, the Soil Conservation Service, and others. The same has been true for those parts of the program carried by the Departments of Commerce, Labor, and Health, Education, and Welfare, and other operating agencies.

The stated purpose of this administrative procedure has been to avoid "empire building" and "giving a target to enemies of the program." But building need not necessarily involve building empires. It would have been better to put into the program the added resources that were justified. These added resources would have been more likely to give help to the program's friends than to give ammunition to its enemies.

A consequence of the unspecified nature of the program has been to make it possible to represent the effort as being either much larger or much smaller than it actually was. Often, the erroneous inference has been left that the program was a large one.

There has been a more serious consequence of this bland administrative approach. Failure to identify specific funds, programs, and personnel with the program has made it possible simply to continue and expand previously existing programs which had little orientation toward the low-income sector, while making pious reference to expanded Rural Development Program activities. Anyone at all familiar with research, education, and action at the Federal, State, and local level, is aware of the immense inertia of on-going programs. Terrific exercise of the budgetary and administrative discipline is needed to bring about a real change in direction.

This kind of muscle simply has not been used in behalf of the Rural Development Program.

While it is impossible to state the true dimensions of the Rural Development Program, some clues can be found. The Secretary's Annual Report indicates that for fiscal year 1961, $2.7 million was appropriated to the Department of Agriculture for direct administrative, extension, technical and research services related to the Rural Development Program. The first appropriation for the Rural Development Program was in fiscal 1957, 4 years earlier, and totaled $2 million. For a new and widely heralded program, a growth of 35 percent of 4 years from a low base is not very much.

The recent *yearly cost* to the Federal Government of the Rural Development Program has been approximately equal to the *daily cost* of storing and managing our $9 billion surplus of farm products. In other words, the Department of Agriculture has been spending about 400 times as much just in carrying our surplus wheat, corn, and cotton as it has spent on the Rural Development Program. In my opinion, the cause of equity would be advanced by cutting expenditures for price support, which go to better-off farmers, and increasing the resources available to the Rural Development Program, which lifts the capabilities of those in greater need.

During the last 6 years the Federal Extension Service carried a large part of the responsibility for the Rural Development Program and received appropriations of $5.1 million for this purpose, an average of less than a million dollars a year. This sum of one million dollars may be compared with $57 million, the total 1961 Federal appropriation to the Extension Service, or with $17 million, which is the incremental growth of the Federal Extension appropriation since the Rural Development Program began. It certainly cannot be said that the Rural Development Program had a high priority on resources available to the Extension Service.

There are about 10 million rural-farm people living in those parts of the country which were designated as generalized problem areas. Annual Department of Agriculture expenditures on the Rural Development Program amount to about 30 cents apiece for these 10 million people. I hasten to add that in addition to these direct expenditures by USDA there are various loans, plus expenditures by other Federal departments, plus public expenditures at the State and local levels, plus financial help from private persons and organizations, plus a large amount of unpaid individual labor in behalf of the program. The total is impossible to determine. But I am talking about the contribution at the Federal level, where leadership lies and where the program was initiated. There the input has been small, however measured.

The stated need for the program and the assistance supplied have not been properly related to each other. Either the need for the program has been overstated or the assistance provided has been too little. It is my view that the need is at least as great as represented, and that the discrepancy is to be found on the side of the limited effort.

Some may say that resistance to the program has placed a limit on its size. There are indeed resistances: from the already industrialized areas which fear the competition of industry in the rural regions, from organized labor which fears rural competition for jobs, and from large farm operators who want an abundent supply of low-cost rural labor. But these resistances could be softened by an intelligent and aggressive educational effort.

In my view, a major additional shortcoming of the program has been to spread existing resources over a broad geographic area, without substantial additional appropriations, with the inescapable result of diluting the program in any given county.

Originally the concept was to launch pilot operations in about 50 of the 1,000 low-income counties. As experience was gained, the program was to be expanded to additional counties, with the help of increased appropriations. This concept was sound.

But an expansion to additional counties (to about 300) occurred before adequate effort or appraisal in the pilot counties, and in the absence of appreciable increases in funds. The result has been to spread the program so thin that results could not readily be seen.

An increase from 54 to more than 300 in the number of counties having programs is an impressive statistic. But I find the increase from $2 million to $2.7 million in appropriations to be a more accurate, though a more modest, measure of effort.

There was a tendency to move in the direction of expanding the Rural Development Program into all rural areas, drawing almost exclusively upon locally-available funds and ideas. In my view, this was an error. Efforts should be concentrated in areas of greatest need, with a large measure of local responsibility but with substantial outside help. If this is not done, the prosperous areas with greatest resources will be spending more on Rural Development than the poor areas with limited resources, and the disparity of economic position within agriculture, area by area, would be further widened. This is not the objective. I think we should frankly recognize the need to transfer resources to those areas which have the greater need, and thus to augment there the agents of change. The transfer of resources from one sector of the economy to another, if needed, is a Federal task. I think the need exists.

One has the feeling—or at least I do—that Federal inputs have consisted, for this program, of liberal quantities of inspiration and publicity,

with very modest inputs of funds and central direction. If one were to compute a ratio of word output per dollar input, program by program, the Rural Development Program would, I think, rank near the top, exceeded perhaps by the activities of the Peace Corps and Caroline Kennedy. In a manner of speaking, a large output of words with limited input of dollars is a measure of success, though not a very satisfactory kind.

In the Rural Development Program, an objective has been to stimulate State and local participation, and this is good. If one were to compute the ratio of Federal to non-Federal inputs, program-by-program, the Rural Development Program would undoubtedly produce a low ratio. Again, in a manner of speaking, a low ratio of Federal to non-Federal outlay may be a measure of success. This is true if one is interested in a low ratio rather than a large accomplishment. In planting a crop, one is more interested in increasing the total yield than in achieving a low ratio of seed per acre.

Recent Developments

Under the new administration, the orientation of the program has been changed, with what appears to be a willingness to supply greater resources now than formerly. There is the $100 million windfall resulting from the Area Development Program; this constitutes a new resource regardless of who administers it. Primary responsibility for the program within the Department of Agriculture has been shifted to the Farmers Home Administration, possibly marking a shift in emphasis from education to credit as a tool for expediting change. As a basic tool for this job, I doubt that credit is as good as education, though both are useful. The program has been further broadened; assistance is to be made available in 460 rural counties in 38 States. One hopes the resources committed will be sufficient in any given county to provide visibility to the program.

It is too early to appraise the effort under the new administration. Both the successes and shortcomings of the past 6 years should be taken into account in reshaping the program.

Responsibilities of Agricultural Agencies

One final word about the Rural Development Program. This is a program for rural people in low-income areas. These people feel themselves a part of the rural community, and feel kinship with the agricultural services of Federal, State, and local Governments. This is true in spite of the fact that they have not been particularly well-served by the agricultural agencies.

By virtue of their location and their group identification, these people are natural constituents of the agricultural agencies. Unless they are adequately served by agricultural agencies they will be served increasingly, and probably less well, by the Department of Commerce or the Depart-

ment of Health, Education, and Welfare, or by some other arm of government. *The problem of rural poverty will not be allowed to go unattended. The Department of Agriculture should put its arm around these people.*

This is not to argue that agricultural agencies should try to preempt the field. Other departments provide useful services; they should continue to do so, and to do more. I am simply saying that the agricultural agencies have primary responsibility and opportunity for serving the very large numbers of rural people who are in severe economic difficulty.

This doesn't mean that these people should be steered into agriculture —or steered out. It simply means that they should be taught to steer, in which case they will steer their own course and do it well.

In 6 years' time we have learned what needs to be done. Now we should get on with the job.

DISCUSSION: RURAL DEVELOPMENT ACHIEVEMENTS AND SHORTCOMINGS AS SEEN AT THE FEDERAL LEVEL

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Dr. Paarlberg's paper is more than a mere summary of the experience of the Rural Development Program over the last 6 years. It provides insights concerning the kinds of approaches that must be taken if Government action to reduce rural poverty is to be effective. Dr. Paarlberg's analysis is particularly valuable at this time, when plans are being made to expand assistance greatly to depressed rural communities under the Area Redevelopment Act.

One of the most important contributions of Dr. Paarlberg's paper is its reemphasis of the *human resource* approach to problems of rural areas. Vastly greater recognition is being given now than formerly to the need for improving utilization of human resources. This is evidenced not only in the Area Redevelopment Act but in many other programs and policies. For example, the Administration is supporting bills for training and retraining workers with obsolescent skills and for training persons of low skills, such as displaced agricultural workers and school dropouts. There may be an opportunity therefore to broaden our approach in rural development work along these lines.

I agree with Dr. Paarlberg that many achievements have been made under the Rural Development Program. One of the important lessons has been, as Dr. Paarlberg indicates, that problems of rural underemployment

and low income are complex and cannot be approached, as often as they have been in the past, with simple solutions primarily of a local agricultural character.

Government personnel concerned with Rural Development Programs have for the most part been agricultural specialists. Because of their close and continuing relationships with rural people, these men are an important link between the Federal government and thos whom the government serves. But they are not specialists in manpower or economic development. Inevitably, they tend to lay heavy stress on attacking specific problems associated with the business of farming; e.g., improving the productivity of small farms, conservation practices, better marketing of farm commodities, or obtaining credit. This is quite different from a comprehensive approach to development of human resources.

In fact, one-sided programs of agricultural specialists may aggravate manpower problems. For example, some Federal agricultural programs have encouraged changes in the structure of agriculture in the South which resulted in the displacement of tenant farmers. These people were left to their own devices in making the difficult adjustment to other employment or to urban life.

I suggest that the Rural Development Program would profit significantly by placing greater reliance on the service of experts in fields other than agriculture. A solution to problems of rural underemployment and unemployment should involve programs directed toward raising skills and expanding placement services for rural people in surplus labor areas. Activities such as aptitude testing, vocational guidance, exploration of training possibilities and potentials, assistance in securing farm or nonfarm jobs locally or in other areas, and the development of nonagricultural jobs in the area's economy are urgently needed, and they cannot be undertaken by agricultural specialists alone.

The Federal-State employment service network has a particularly important contribution to make in these respects. Although recognition has been given to the need for employment service participation, we have never had adequate funds to do as complete a job as necessary in distressed rural areas. In fact for a period of several years we were specifically enjoined by Congress from using employment service funds in Rural Development activities.

Recently, however, five State employment security agencies, in cooperation with the national office and the Agricultural Extension Service, embarked on experimental programs to test new approaches. These programs include surveys of manpower in relation to economic resources, counseling and testing of unemployed and underemployed people, intensified efforts to develop job opportunities, and work with local and State

agencies and private groups in coordinated plans for economic development.

Dr. Paarlberg's paper expressed the opinion that the Rural Development Program was extended to too many areas at too rapid a pace. The concentration of effort and resources in fewer areas, and a more careful review of experience under the program before enlarging its scope, might have been more effective. Unfortunately, the same problem may be arising in the administration of the Area Redevelopment Act. As Dr. Paarlberg noted, the administrator has designated 468 predominantly rural-farm counties as eligible for assistance. While available resources under the ARA are substantial compared with those under rural development, these funds are still very small in relation to the size and persistence of the problem. There is a real danger, as Dr. Paarlberg points out, that redevelopment funds will be spread too thin and that false hopes will be fostered that dramatic improvements can be made quickly over large parts of the country.

Another major point made by Dr. Paarlberg was the need for more Federal guidance and leadership in development efforts—although local participation is still essential. The Area Redevelopment Act does provide for a greater measure of Federal direction. Under the ARA local plans for economic development must be submitted to the administrator for prior approval and technical assistance is given to local groups in connection with plans and projects. Individual projects must fit in with the goals of long-range plans. There is also a greater recognition under the ARA of the fact that the solution of rural poverty is related to non-farm job opportunities and that most farm youth must look to off-farm work for a livelihood. The ARA provides for expansion of vocational education facilities and subsistance payments for qualified trainees. Development of nonfarm employment in the area is a major goal, and training for job opportunities outside the area is also taken into account.

With Dr. Paarlberg, I believe that it is essential to adhere patiently to this broad approach; to avoid the temptation of oversimplified dramatic projects or quick panaceas, in order to derive the maximum long-range benefits from our new opportunities for expanding redevelopment efforts.

RURAL DEVELOPMENT ACHIEVEMENTS AND SHORTCOMINGS AS SEEN AT THE STATE LEVEL

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THIS spring the Secretary of Agriculture announced a new Rural Areas Development Program to replace the pilot Rural Development Program. In May Congress passed Public Law 87-27, establishing the Area Redevelopment Administration within the Department of Commerce to speed up economic development in rural and urban areas. Experience in Rural Development during the last 5 years is pertinent to both of these new programs.

The Rural Development Program was initially launched in 50 counties located in 30 States where incomes and levels of living had failed to increase at the same rate as those in the nation. National leaders were anxious to determine if established governmental agencies could redirect a portion of their normal resources into a joint effort to support a locally initiated and directed, long-range, economic development program. The basic purpose of the Rural Development Program was to help local leadership mobilize all available organizational, technical, and financial resources in support of action groups working to create more and better economic opportunities for rural people.

Specific attention was focused on: increasing farm and ranch income; expanding local employment opportunities by importing, creating or expanding local industries or businesses; and improving community services and facilities to make better places to live and work. Success of the program would be indicated by an increasing level of economic activity with expanding opportunities for all families in Rural Development pilot counties. Value of efforts at multicounty, State, and national levels could only be measured as they contributed to and supported the work of these local action groups. This, then, is the framework for examining the rural development experience.

State Committee Responsibilities

Responsibilities of the State Rural Development Committee were described on page 2 of the *Rural Development Handbook,* published by the National Rural Development Committee in 1959. The handbook states:

"It is the responsibility of the State-level rural development committee to select pilot counties or areas within the individual States, and to help leaders in local communities organize and maintain a development pro-

gram. Agencies represented on the State rural development committee provide workers for the program and furnish whatever research, technical, and advisory help is necessary to move the program forward at the local level. A State rural development committee is the key administrative and leadership unit in rural development. The effectiveness of the work in individual States depends to a large extent on the participation of the agencies represented on its rural development committee."

Obviously, the national committee expected that the State committees would provide vigorous leadership and administrative support for local action groups.

Designation of pilot counties may have been the only responsibility that caused the State committee little difficulty but even that may have warranted more consideration because most of the designations were made on the basis of low *farm* incomes, without considering other factors necessary for a successful project. Through experience, it became evident that social interaction, leadership patterns, and community identifications are particularly important considerations in selecting multicounty areas for development programs. Perhaps a State committee should only designate counties or areas where investigations and educational programs will be launched to gather information and create understandings and attitudes in preparation for subsequent organized development effort. Experiences abundantly prove that there should be an explanation of the proposed program to top leadership in a county or area to secure approval before publicly designating the county as eligible to participate in the development effort.

State committees were provided secretarial assistance by an Extension Service employee in most cases, but no full-time employee was available to implement suggestions and service needs of the committee. Generally speaking, State committees had comparatively little success in meeting the responsibilities assigned them by the national committee, particularly in becoming the "key administrative and leadership unit." Practically, these functions were carried out by employees of participating agencies in the name of their respective agencies.

Recall that specific agency responsibilities were not assigned at the national level, as we now have under the RAD and ARA programs. Agency roles were not "legitimized" at the local level. Therefore, there was reluctance among agency employees to assume responsibilities. Some States were successful in organizing staff level subcommittees with members authorized to spend enough time on the program to make outstanding contributions.

In spite of the expectations of the national committee, State committees were actually voluntary associations of individuals and agency representatives assembled to exchange information, to identify problems of com-

mon concern, publicly to endorse and support the rural development concept, and where there was unanimous agreement to subscribe to a course of action in the name of the committee. Outstanding dividends were derived, however, from the State committee meetings.

State Committee Accomplishments

In preparation of this paper, a brief questionnaire was mailed to 34 State committee chairmen, 18 of whom replied. You will be interested in some of their replies to the following: "Please list the five most significant accomplishments of your State Committee during the past 5 years in supporting the achievement of rural development objectives at the local level."

1. Members became aware of the need for a broad based development program at the local level touching all aspects of the economy and, consequently, each participating agency or organization became more sensitive to answering requests for assistance from the local levels in an expeditious manner.

2. Regular meetings and newsletters provided a means for exchanging information among members concerning successes and difficulties of local groups and general progress of the program, greatly facilitating communication among interested groups at the State level. Some compared the committee to a "clearing house" for ideas on rural development.

3. A high level of cooperation and teamwork developed among committee members and their representatives at the local level because of personal acquaintances and deeper understanding and appreciation for the functions of the various agencies and organizations.

4. Through committee activities, members became aware of the needs and problems involved in successful development programs at the local level. Specific examples mentioned were recognition that agricultural adjustment problems can't be solved within agriculture alone, and realization that county lines are not important in economic development.

5. Because of the understandings and acquaintances developed during committee meetings those working with local groups were able to guide and direct persons seeking assistance to the best sources.

6. Committee members supported the work of the local groups by suggesting solutions for problems and organizational patterns for coming to grips with problems. One reported that the mere existence of the State committee proved to be a motivational device to encourage local action groups.

7. The State committee provided recognition for the work and achievements of local groups by meeting in the area and by hearing special progress reports. Oregon reported that the State committee provided stimulus to usage of local hardwood timber which led to the establishment of three mills.

Last year, members of the Texas Resource Development Committee participated in an informal appraisal of the program. Replies to one question are pertinent to this discussion. "As you have observed the operation of the Resource Program in this State, what problems or difficulties have been the most troublesome?" Replies to this question follow:

Getting the Resource Development concept activated in the county.

Lack of interest at local levels where the program succeeds or fails.

Difficulties associated with mechanics of establishing specific goals and organizing coordinated action to achieve them.

Failure of leadership to develop action plans based on local situation.

Implementing propsals for worthy community improvements.

Lack of collaboration between agencies and lack of common understanding of Resource Development concept among agency personnel.

Lack of specific goals at the State and national level.

Lack of coordinated leadership or program guidance.

Surely these same problems have proven troublesome to other State committees.

How To Strengthen State Committee Work

Suggestions provided by the State chairmen for strengthening committee work in the future are particularly helpful for those concerned with new development programs. The following replies were given to the question, "What additional activities do you believe the State committee might appropriately undertake to further support the accomplishment of Rural Development objectives at the local level?"

Publish a long-range economic development guide.

Arrange to provide local development groups additional technical assistance.

Assemble more pertinent data for program development at the local level and assist in its interpretation.

As an aid to future planning, help local groups measure accomplishments and results in terms of announced objectives of the Rural Development Program.

Members should become more familiar with the program objectives.

Clearly define duties and responsibilities of participating groups and agencies.

A chain of command should be clearly defined and arrangements made for effectively coordinating efforts of participating agencies and organizations to reduce duplication of effort.

Launch a well-rounded educational program to define the program and what to expect from it.

Identify assistance not available through the agencies and organizations represented on the committee but needed at the local level.

Enlist support of the top influential business men of the State.

Take more initiative in promoting inter-county cooperation to work for development on an area basis.

Support investigation of possible outside market outlets for local products.

If we are to be successful in our attempt to build a new agri-industrial rural economy, there is almost universal agreement that we must have a coordinated program involving new vocational educational opportunities coupled with more use of available educational facilities, different forms of credit to ease agricultural adjustments, improved community services and facilities to make the community a better place to live and work, more employment opportunities outside agriculture, and larger-scale farm operations.

Introduction of a single new agency program will not produce the desired result. Local leadership needs the timely support of a whole series of mutually supporting services and facilities. The State committee provides the logical mechanism for making these services and facilities available to local development groups.

Composition of the State Committee Membership

Membership on the State rural development committees varied greatly from one State to another. In Texas, for example, membership was composed of representatives of 22 State and Federal agencies that could make a contribution to efforts of local groups. The Texas committee met twice a year, devoting a day to each meeting. About half of the meetings were held in pilot areas.

Several other committees included representatives of Statewide organizations and interested individuals. Ordinarily, these larger committees met once a year and depended upon an executive committee to carry on the business in monthly meetings.

In many States, special problem subcommittees were organized to seek out information and develop suggestions for use of local groups. This practice should definitely continue in the new programs. In most States, Federal and State agency representatives were participating members. One difficulty frequently mentioned was the fact that questions discussed during committee meetings were of such nature that agency policy was involved; in the absence of the head of the agency, the representative was unable to make commitments, and was reluctant to express opinions.

State and area committees in the future will surely find ways to carry on Statewide or area educational programs that will help create attitudes and understandings to support the developmental efforts of local groups. This may be the greatest unrealized potential of the State and area organizations.

Problems Local Development Groups Encounter

A group of leaders in "X" county want to know why agricultural income in their county is now less than $5 million, while it is more than $12 million in an adjoining county with poorer soils. A cabinet-maker needs help in expanding his family operated, custom order business to a manufacturing concern that will provide additional jobs in the community. A middle-aged fisherman knows how to make high quality flies so he wants to start a manufacturing business with about five employees, but he is having trouble training workers, planning production, and securing credit. With an annual production of more than 5 million broilers in the nearby area a committee has worked for 2 years to help establish a poultry processing plant that would employ more than 100 people in a community of about 2,500 population but when one barrier is removed there always seems to be another.

Educational work in forest management has proven successful during the last 30 years but now timber owners learn that their pulpwood price is almost the lowest in the nation so they want to know what they can do to get a better price. Credit needs were less than $1,000 to produce a crop on the traditional small scale East Texas farm, but studies show that the timber and beef cattle business replacing the traditional row crops require investments of up to $50,000 production capital to make a family living but no lending agency is willing to make loans on such a scale. One county committee simply disbanded after a year because it couldn't identify a project that seemed worthwhile.

These are the broad and diverse problems that confronted rural development committees at the local level. Some were successful in dealing with these perplexing situations but all of the committees needed additional technical assistance. These problems and this program provide a real challenge to economists in the Land-Grant College System.

How Economists Have Helped

In answers to the questionnaire sent to State committee chairmen, there was a large measure of agreement in the replies to the question: "Briefly describe the specific contribution agricultural economists (research, teaching, and extension) have made during the past 5 years in your State toward helping accomplish Rural Development objectives at the local level." You will be pleased with the replies, which follow:

Published findings of studies which helped agents and local leaders gain a greater understanding of the economic and social forces which were operating to make adjustments in farming necessary.

Aided in making inventories of the human and natural resources of the area and in determining developmental needs and opportunities.

Determined economic feasibility of new agricultural and other economic enterprises.

Helped interpret laws pertaining to rural development.

Acted as resource people to extension agents and local groups.

Helped farm families in developing an improved management program to increase family income and levels of living.

Organized short courses for in-service training of extension personnel.

Conducted research to identify causes of low income in rural areas.

Contributions Economists Could Make to Future Programs

State committee chairmen made several constructive suggestions on how economists could contribute toward speeding up progress in future economic development programs.

Agricultural economists have to put more emphasis on helping people understand the need for development programs organized in multicounty areas.

More work is necessary in the policy or public affairs field. Alternatives related to economic development and their consequences need to be presented to local groups. Agricultural economists are the best qualified persons to carry out this work.

They can help to identify new agricultural enterprises with market potential, or identify changes in production to meet the market demands which would be more economically beneficial in the local areas.

Agricultural economists can contribute most to rural development in the area of farm decision-making where individual farm plans are developed relating to:

1 Efficient use of land, labor, and capital.
2 Enlarging the farm operation.
3 Credit.
4 Contribution of part-time farming to family living.

There is need for a team approach to the problems of agricultural adjustment and to over-all economic problems for procuring and analyzing data, and helping local groups to translate the data into problems, followed by action programs based on the most promising alternatives.

The program needs help in determining what additional information is needed to identify opportunities for expanding local economies, and assistance in finding the means for obtaining it.

Research in forest economics is needed to determine practical management programs for owners of small tracts of woodland.

Considering the relatively small amount of money invested nationally in the RD program, much more progress was achieved than might have been expected. Local leaders that were involved feel the effort should

continue. Nationally, the program has received favorable public acceptance. Looking to the future, the most difficult problem that remains unsolved is the selection of appropriate projects by local committees. These committees have demonstrated that they can effectively gather information about their local area, including the completion of informal surveys. But they experience serious difficulty in using this information as a basis for identifying realistic opportunities to speed up economic growth. This critical situation provides an opportunity and challenge to economists throughout the country as we move into expanded Rural Development Programs.

DISCUSSION: RURAL DEVELOPMENT ACHIEVEMENTS AND SHORTCOMINGS AS SEEN AT THE STATE LEVEL

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Mr. Sheppard has very well described many of the achievements and most of the shortcomings of the Rural Development Program as seen at the State level. But it is perhaps worthwhile to note that the Rural Development Program was initiated on a demonstrational or exploratory basis with very little guidance from the national level. This, in my opinion, was good since it revealed an early recognition that this type of work could not be forced into a fixed pattern.

Early efforts in finding solutions to the low-income problems of farm families probably over-emphasized the agricultural aspects of the problem. Recently, more recognition has been given to other areas of concern such as education and training, credit, youth, health, community services, and industrial and commercial development. However, some "pilot" counties never got a vision beyond the agricultural sector.

In reference to Mr. Sheppards' comments concerning the responsibilities of the State Rural Development committee, I would like to emphasize the point he makes about "the national committee expectation of State committees to provide vigorous leadership and administrative support for local action groups." The facts are some agency representatives at the State level did not get much encouragement or guidance from their national counterpart. In some cases, this seemed to result from the fact that some departments of government and agencies at the national level did not receive special allocation of funds for this work. In my opinion, this same situation could have some bearing on agency participation at the State level in connection with the Rural Areas Development and the Area Redevelopment Programs.

I heartily endorse Mr. Sheppard's statement that leadership in a county or area should be consulted before the county is designated for participation in a Development Program. One of the strong features of the Arkansas State committee has been the cooperative team approach to counties. Several representatives of the State committee have visited with leaders in a county or area at a public meeting to explain the Rural Development Program and to ask if leaders in the county wanted to participate. This, to me, is a desirable principle to follow when presenting any development-type program, of having people volunteer to participate in an action program to improve the economic and social conditions in the area.

With reference to State committee assistance, some State Agricultural Extension Services provided personnel at the State level to work in liaison between agencies and organizations at the State level and between the State committee and the pilot counties and areas. In Arkansas, we believe this assistance is very desirable.

Mr. Sheppard is to be commended for polling the State committee members. Their list of the most significant accomplishments is consistent with general reports from other States. I was glad to see listed the awareness of the need for a broadly based program at the local level touching all aspects of the economy and all primary groups. This will involve more of the State committee members for assistance at the local level.

The problems listed by members of the committee are also consistent with most general reports from States. These same problems have proven troublesome to other States; however, I believe the "learning" experiences in the Rural Development Program have been very beneficial. Certainly, we should endeavor to pool these experiences for an approach to the development programs now being activated. One very beneficial way to pool these experiences has been regional meetings between States to exchange ideas. This gave not only an exchange of ideas, but also encouragement and stimulation beneficial to agency personnel as well as lay persons.

Another problem not mentioned by Mr. Sheppard is giving due recognition to all agencies and organizations for their contributions to a given effort. We have recognized this problem but have not found a satisfactory solution.

One of the problems mentioned it seems to me should be amplified. This was, "Implementing Proposals for Worthy Community Improvements." In Arkansas, this simply meant that we did not have financing available in these low-income counties to do some things the people agreed should be done. An example is the recognized need of county-wide studies on the educational and training needs over the next 10-15

years. Qualified personnel from the university and the State Department of Education are available and local committees are willing to help, but they did not have the finances to make the studies. I hope that Area Redevelopment Administration funds can be used for such technical studies so important to many counties that want to reorganize educational and training programs but do not have factual information for initiating action. Incentive funds can be helpful in speeding up desirable changes.

The replies from committeemen on "How To Strengthen State Committee Work" are consistent with general reports from other States. With reference to publishing long-range economic development guides, it would seem desirable if this could begin with a study of the larger economic regions in a State. One question now is: Can ARA funds be used for technical studies of these larger regions to reflect the projected potential of the area?

An additional point on strengthening State Committee work would be an effective communication program whereby State committee members can be kept better informed of activities at the State level as well as the county and area levels.

With reference to the composition of the State committee, I would agree with Mr. Sheppard, that agency or private organization representatives should be able to make commitments for the agency or organization represented. In Arkansas, the State committee is composed of 47 representatives of agencies of government and of private and public organizations. The steering committee of 22 members is the action committee for the full State committee. The State committee membership is divided into five major interest groups determined by the Committee. They are: Agriculture and Forestry; Education and Training; Industrial Development; Health and Welfare; and Community Facilities and Services. These interest groups meet with representatives of the pilot counties and area for information, exchange of ideas, and stimulation of interest.

I agree with Mr. Sheppard that most local leaders recognize more has been accomplished in most counties than was originally expected. It has taken some time for diverse interest groups to learn how to work together. This is true at the State, area, and county levels. It has taken time to develop attitudes of working together and to learn that desirable changes can be made with cooperative effort. For example, one county has been working four years on educational problems and is just now recognizing the need for a county-wide study on educational and training needs.

In his statements of how economists have helped, again, Mr. Sheppard's comments are applicable to most general reports from other States. In addition, in most States economists assisted in the initial selection of pilot counties. In Arkansas, economists were influential in recommending pilot counties be selected in different type farming areas. This has been

helpful in developing economic programs for surrounding areas. Economists in Arkansas furnished information for selecting the five-county area as a Rural Development Area.

I would like to add, to the section on "Contributions Economists Could Make to Future Development Programs," that we must rely on economists to relate the various development factors to the State, regional, national, or international situation.

I would also like to emphasize the team approach on problems in economic development. Economists have the background to involve others on a team or cooperative effort. In many cases, economists can best show the necessity of cooperation and the interrelationships of many diverse groups interested in finding solutions to complex problems in low-income areas.

In conclusion, I am sure that with economists providing analyses of factual data for developing sound programs and working with persons like Mr. Sheppard in bringing together people from many interest areas, ways will be opened for more effective assistance to local groups in their continued effort in economic development and social improvement. The people in each State, area, or county will have to find means for more effective working relationships. Certainly, principles are more important than a set pattern in development-type programs.

Mr. Sheppard is to be commended for this analysis of the achievements and shortcomings in the Rural Development Program as seen at the State level.

RURAL AREA DEVELOPMENT IN A GROWING ECONOMY

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THIS PAPER examines the prospects of the continuing Rural Development Program and the new Area Redevelopment Act in resolving the profound geographical differences in labor factor rewards, whether within or outside the agricultural sector. These substantial differences have persisted in the United States during all of the 20th Century, and it is in this long-run context that we approach the problem. We are concerned with the analytical aspects of rural development in an economy in which persistent full employment in urban centers has not been characteristic during the last 60 years, and in which underemployment in rural areas continues to be characteristic. We conceive that this occurs in a dynamic, mass-consumption, and—in the Rostovian sense—technically mature economy.

For our purposes, we define economic development as applied to an area or sector of an overall economy, such as that of the United States, to be the achievement of increased income per capita and, if incomes are presently relatively low, progress toward attainment of real returns for the economic use of comparable factors equivalent to those realized on the average in the economy as a whole. We take as the best indication of such achievement equivalent labor incomes to persons of comparable labor capacity.

We examine (a) the appropriate size and distribution of local development areas, (b) the relevance of macro-variables in explaining the existing geographic differences in labor factor rewards, and (c) the need for a model that will deal adequately with local factor income in a situation of less than full employment, coupled with downward inflexibility of wage rates.

As we look at the map, we are struck by the fact that employment opportunities are concentrated geographically. Although there is nothing new or profound in saying this, apparently the implications of this fact have not occurred to many persons in rural areas, who deplore the outmovement of local people to areas of superior economic alternatives. While we strongly doubt that the existing regional distribution of major industrial centers represents an optimized locational pattern of employment opportunity, we emphasize that the development process, as even the highest income areas have demonstrated, depending so largely upon urban growth, engenders cities in only a selected number of counties in a given State. For example, the level of economic opportunity achieved in the State of Ohio exists as a far-off goal for many States, particularly those

in the Southeast. Perhaps no single State represents a more highly integrated level of both agriculture and industry than does Ohio. At least, it represents a much higher degree of development than that of any State in the South, and its development is geographically well disseminated. It is not dominated by a single large city, as are Illinois and New York, and yet, with all this development, about half of the Ohio counties have no community containing so many as 25,000 people, and two-fifths have no community containing so many as 10,000.

County development patterns of similar characteristics occur in other high-income States. This evidence indicates that nodality[1] is a part of the development process, and that it would be unreasonable to expect a differing pattern of development in a more fully developed Tennessee or Arkansas, for example.

It seems to us that preoccupation with single-county development other than for pilot or demonstration purposes may lead to development policies of lesser impact than those which recognize the nodality of economic growth. We think of an appropriate development unit as a multi-county unit containing a central city or nodal point. In most instances, such a center already exists. Frequently, it is in a county that is not particularly rural. It is in these centers that major hope lies for the provision of new employment opportunities for locally redundant labor supply. We think of these centers as having perhaps populations of at least 10,000 in 1960, although in some instances if there is no community of this size in a considerable area, a town of 5,000 may provide a useful base for local development. In saying this, we recognize that the bulk of absolute industrial job formation will probably occur in cities of metropolitan size. It is true that public acceptance of a rural development program geared to standard metropolitan areas, let us say, is not envisioned in either the Rural Areas Development Program or the Area Redevelopment Act. The fact of the interrelationship of employment in metropolitan centers with that of underemployment in rural areas, however, does force us to look at the next aspect of our problem—the role of macro-variables.

Although the role of macro-analysis is basic to the rural development problem, our belief is that its role deserves additional emphasis and analysis. Even though we are not primarily concerned with the original causes of geographic differences in labor factor income, but rather in the failure of 60 years of national growth to correct the disequilibrium, we recognize that some of the causes may be found in past commercial and

[1] We use the term to indicate the tendency of economic activity to cluster. We judge the two primary economic influences creating this tendency to be the internal economies of the factory system and the external economies of urban organization, each of which contributes to a better organized and more specialized division of labor.

immigration policies. For purposes of this paper, however, we deal with the problem in a closed economy sense, while recognizing that the degree and manner of closure influences the geographic distribution of economic opportunity.

Having said this, the question arises, "What are some of the basic causes of sectoral and areal differences in U. S. income?" Within the actual and historical context of the present economy, we would emphasize:

1. Changes in the conditions of production and demand for factors and products.

2. The differential extent to which, and the direction in which, these changes in conditions of production and demand affect the economics of particular sectors and areas.

3. The differential extent to which adjustment is achieved in the utilization and combination of productive resources in response to changed and changing conditions of production and demand for factors and products.

On the whole, any falling off in the aggregate demand for labor in the major industrial centers will affect the rural sectors by increasing the amount of labor supply redundancy, that is to say, it will increase underemployment or unemployment. This problem becomes most severe in regions most removed from the major employment centers, and those in which rates of natural increase are highest. When nonagricultural employment itself is located in rural areas, as is so in many mining communities, a decline in demand may also provide an especially difficult problem. In general, people in rural areas are residual claimants for industrial job opportunities. Therefore, we regard the establishment of a high level of employment opportunities as a first step in dealing with the rural development problem.

Notice the phrase, "a high level of employment opportunities." By this we do not mean a rate of unemployment in urban centers no greater than, say, 5 percent, nor one that provides opportunities for all urban work seekers and their issue, nor even one that provides opportunities for some rural residents in addition. We believe that the rate of employment opportunity must be high enough to absorb the natural increase of both the urban and rural areas when it becomes of working age, together with at least some absorption of existing redundant labor in rural areas. If this condition is not met, rural development groups will find themselves in an increasingly retarded position.

The achievement of increased employment opportunities at levels of productivity and income comparable to the national average is the fundamental goal of all area development efforts. Similarly, a fundamental goal of the Nation as a whole, and a necessary condition for attainment of many of its other goals, is full employment. We take this to mean, in

addition to absence of involuntary unemployment, the elimination of involuntary economic underemployment, which is to say, the achievement of equivalent real returns to labor of comparable income-earning capacity and economically relevant tastes in different areas and sectors.

Therefore, there are both area and economywide interests in program possibilities for achieving increased employment opportunities. Our concern here, then, is to sketch in necessarily broad strokes our conception of the possible role and interrelationships of rural area and national economic development.

Consider first the possibilities of individual rural area action. In the very conception of a rural area as presented above, we have suggested one of the important things that can be done at the individual area level. This is to organize activity within a viable area economic framework; to achieve an area organization that is attuned to the realities of economic life in the United States today and in the foreseeable future. A lower income State or area bent upon economic development would be well advised to emphasize its existing or evolving nodal pattern rather than to divide it equally among counties, towns, or villages.

Beyond this, we suggest that there are three basic approaches to economic development of individual rural areas:

1. The attainment of expanded or revised nonfarm economic activity on an economic basis soundly related to the locational and other resources of the area.

2. The reorganization of the agricultural sector in the way necessary to raise returns to the human agent to a level resulting in comparable returns to labor of comparable capacity and tastes.

3. In the absence of local employment opportunities, the realization of sufficient migration to superior employment opportunities outside the area.

From our definition of area economic growth (achievement of increased earned income per capita), and perception of the approaches to it, it is evident that we do not consider such development as necessarily synonomous with industrialization or secularly increasing population. It is also evident from the approaches listed above that what an area can do is importantly conditioned by what is happening in the economy as a whole.

We do, however, recognize two types of possibilities for an individual area to improve its relative position more or less independently of national activity.

1. If the area has a sound and much better promotion and information program than those of most other areas, it may improve the relative share of new economic activity it attracts from outside. It is our judgment that this factor is likely to be of secondary importance, especially when full employment does not exist. So far as the economy as a whole is con-

cerned, the gains of one individual area may be regarded as largely offset by losses of another more or less comparable area.

2. If new economic activity, financed and directed from within the area arises, it would be viewed as a net gain for both the area and the national economy.

In speaking of macro-variables and full employment, we are thinking not only of the monetary and fiscal approaches to the creation of a high level of demand for labor relative to its supply; we recognize also that a closer analysis of the employment problem might lead to a closer examination of both wage and price policies. Empirically, these latter influences have received only scant attention. Given the existing locational mix of economic opportunities, the fact that offspring of urban workers usually preempt the available job openings in urban centers, the prevalence of seniority systems in most firms, and the downward inflexibility of urban wage rates, it may well be that we do have a *de facto* geographic segmentation of the labor force in which the bulk of redundant rural labor enters the urban markets as residual claimants. In addition to these considerations, the macro-economic influence of past and present commercial and immigration policies (including such quasi-immigration arrangements as those affecting farm laborers) deserve to be mentioned in this context.

In looking into the significance of the macro-economic variables, we have been struck by the degree to which the full employment conditions needed for a perfect application of micro-economic theory to rural development problems do not and have not applied. We have, therefore, developed a continuum or "chain" by which we hope to make explicit the way in which the local economies are affected by differing levels of the fullness of employment. This formulation is heuristic rather than definitive; it begins at the low point.

1. Involuntary unemployment of primary[2] workers on the national and all local levels, coupled with net disinvestment of capital in the aggregate sense.

2. Involuntary unemployment of primary workers on the national level with an absence of involuntary unemployment in at least some local areas, coupled with net investment of capital in the aggregate sense.

3. Absence of involuntary unemployment of primary workers in the aggregate sense and in all urban local areas, coupled with net investment of capital on the national scene but without availability of equivalent real

[2] We use the term primary worker in the sense employed by Wilcock, Richard C., in "The Secondary Labor Force and Measurement of Unemployment," in *The Measurement and Behavior of Unemployment*, (Princeton: National Bureau of Economic Research, 1957), p. 169. "Secondary workers may be further described as those who typically have some leeway in deciding whether to be in or out of the labor force, while primary workers, until they retire, are normally in the labor force unless illness or other reason forces a temporary withdrawal."

income opportunity for rural primary workers and their issue either in local areas or nationally.

4. Absence of involuntary unemployment of primary workers in the aggregate sense and in all local urban areas, coupled with net capital investment, with equivalent real income opportunities for local primary workers, both rural and urban, and their issue in some, but not all, local areas.

5. Absence of involuntary unemployment of primary workers both nationally and in all local urban areas, coupled with net capital investment, with equivalent real income opportunities for local rural workers and their issue in all local areas, but with differences in real income from one area to another.

6. Absence of involuntary unemployment of primary workers, both nationally and in all local urban areas, coupled with net capital investment, and with equivalent real income opportunities for equivalent quality levels of labor input regardless of community size and geographic region.

The development of such a continuum could better indicate the magnitude of the adjustments needed to achieve a truly full employment equilibrium. It could serve also to direct policy toward even more constructive channels of action than now appears evident.

By way of summation, let us look again at the current Rural Areas Development Program, and the Area Redevelopment Act. A second look leads us to judge that:

1. The amount of the appropriation for low-income rural areas represents only a fraction of what would be necessary to affect significantly low rural incomes so that sectoral and regional labor factor rewards would be equalized. However, we are of the opinion that these programs are useful in helping to solve some local problems.

2. The importance of the existing local community or market area center as a rural development base appears to be gaining recognition among the administrators of the programs, so that some of the most obvious pitfalls relating to investment in rural industry may be avoided.

3. Unless conditions of full employment prevail in urban centers, the full impetus that the programs can give to rural development will not be realized.

4. If conditions of involuntary unemployment exist in urban centers, the programs may serve to eliminate some underemployment in rural areas at the expense of shifting its incidence in the form of unemployment to established urban centers. To a certain extent, even though these influences could cancel out each other, greater recognition of the general problem might result if it is reported to the public in terms of a familiar *un*employment measure rather than as a less familiar and perhaps more abstract measure of *under*employment or of labor redundancy.

DISCUSSION: RURAL AREA DEVELOPMENT IN A GROWING ECONOMY

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Serious students of the economic development process will not question either the basic causes of sectoral and areal differences in income or the basic approaches to the economic development of individual rural areas as presented by Bachmura and Glasgow. We are indebted to them for their clear and concise statements on these matters. Further, I for one find it quite refreshing to see formulations of new frameworks that may be of use in giving us better insights into the relationships between the rural and urban sectors of the economy. I refer specifically to their "continuum by which to make explicit the way in which the local economies are affected by differing levels of the fullness of employment." It is to be hoped that Bachmura and Glasgow will have the opportunity to elaborate this formulation, construct operational hypotheses, and test them in the near future.

The reemphasis of the role of macro-economic variables by Buchmura and Glasgow will be welcomed by those who have been concerned that thinking in rural development was becoming too oriented toward very small geographic or political areas. Physical resources are notoriously disrespectful of lines around political subdivisions, while the opposite is characteristic of the way in which man tends to organize his activities. Given the realities of administrative organization and decision-making, I suspect Bachmura and Glasgow would agree that we will not see substantial shifts in perspective during the immediate years ahead. Nevertheless, I am always hopeful that efforts of researchers will have a tempering influence on provinciality.

Although it is provocative, I question the strength given the proposition "that we do have *de facto* geographic segmentation of the labor force in which the bulk of redundant labor enters the urban markets as residual claimants." This statement, because of the reasons given by the authors, and for other reasons, too, does have an intuitively appealing ring of finality. However, I am not yet ready to go this far. If the authors meant this as a less than fully tested hypothesis, then I would certainly agree. Mr. Ralph Loomis, with the USDA at Michigan State, is currently testing a form of this hypothesis and his results should reveal additional evidence on this proposition.

Despite the pressing need for new ideas, such as those presented by Buchmura and Glasgow, to help us reveal relationships between, among, and within sectors of the economy, there remains, it seems to me, a great

deal of unexploited potential in the "old" ideas. Rural area development, or almost any kind of development, is largely a matter of resource allocation, and agricultural economists and economists have constructed a rather imposing array of propositions about resource allocation. I frequently find it difficult to maintain patience with those who decry the lack of *a* theory of economic development. Possibly the situation is analagous to one we find in applied mathematics where Euclidean geometry may not explain all spatial phenomena but it works tolerably well for solving many problems.

The contention that there is unexploited potential in existing propositions can be illustrated by taking the first basic approach to economic development of individual rural areas presented by Bachmura and Glasgow, namely "the attainment of expanded or revised nonfarm economic activity on a basis related in a sound economic manner to the locational and other resources of the area." Basic to any prescriptions for the expansion or revision of nonfarm activity is, of course, a purposive measurement and evaluation of the resource base. Although this task is not new to agricultural economists or economists, it may require a great deal of imaginative reformulation of existing techniques. Beyond this, the export-base theory of growth comes immediately to mind as a possible source of useful hypotheses. This theory may be of substantial value for studying those areas which have or appear to have potentially a limited number of export activities or have limited resource endowments. It is recognized there will be knotty definitional problems involved in the use of this approach, but its principal feature, the attention that must be given to events and conditions "outside" the area, may well be worth the effort. The next step, determination of "multipliers," helps reveal the growth possibilities of the "filling-in" process or the advisability of the "emptying-out" process.

Sector theory with its emphasis on internal relationships is also likely to yield fruitful hypotheses for studying the growth process. Several extensions and additions to this theory can be found in the literature. (Isard's *Methods of Regional Analysis* and the RFF study *Regions, Resources, and Economic Growth* are notable examples.) The weaving together of sector theory and location theory should prove to be a valuable source of hypotheses. Again, location theory is not new to agricultural economists but I think it can be said with some degree of truth that location theory has not received nearly the attention it deserves. Work with these formulations leads directly and quickly into considerations of the institutional structure of the area, provisions of social overhead capital, and service industries needed for growth.

To deprecate the perfect competition model now seems to be quite fashionable in some circles. However, it is my feeling that it can and

will continue to be one of our most valuable basic sources of hypotheses to use in studying parts of the growth process. Furthermore, many of the propositions of the model can and should be used without substantial refinement if for no other reason than to provide bases upon which to build more elaborate analyses. Possibly it can be agrued that this is less necessary in on-farm resource allocation today but it seems to me to be particularly appropriate in studies of migration of the human resource from farm to nonfarm activities.

That all human beings and all geographic areas ought to share in the economic advances made by our society is a *value* premise held by most people. That some groups of human beings and some geographic areas have not shared very well in past performances of our economy is now a widely held *belief*, which has been tested and validated in a general sense. However, we have not yet adequately established the specific causes for the failure to share of some human beings and some geographic areas. Thus, we have less than full confidence in our recommendations of specific alternatives. This, in turn, has caused rural development efforts to be weaker than is desirable.

Let me end my remarks by saying that if the concept of "balanced growth" means anything at all, it probably can best be applied to the development of thinking in our own profession. The continued serious efforts to forge new tools as exemplified by the work presented by Bachmura and Glasgow, plus the continued serious effort to exploit the "older" tools, may very well be the path to a larger total professional product of higher quality and, hopefully, to a larger per capita product.

CONTRIBUTED PAPERS: THE AGRICULTURAL ECONOMICS CURRICULUM, GRADUATE AND UNDERGRADUATE

CHAIRMAN: C. PEAIRS WILSON, KANSAS STATE UNIVERSITY

THE UNDERGRADUATE CURRICULUM AND TEACHING IN AGRICULTURAL ECONOMICS—A PERSPECTIVE

CARROLL V. HESS
University of Minnesota

A PROPERLY designed undergraduate curriculum in agricultural economics and agricultural business administration should provide students the opportunity to gain an effective combination of both liberal and professional education which will contribute most to their development as (1) good citizens in a free society, and (2) capable and productive professional people. As members of college teaching faculties we have failed our mission in society if we do not provide a curriculum with the necessary depth and maturity of abstract principles to challenge and help the individual to develop according to his potential and to translate into daily actions the breadth of his knowledge and the discipline of critical thinking.

The curriculum and teaching should prepare students to face the economic, political, and social situations of the future, and should provide a basis for introspection and self evaluation for maximum satisfaction from their life's work.

Our mission is to facilitate and expedite the educational process; not to give the student an education since no college can give one an education. We can challenge his intellect. We can give him a sense of exhilaration of fresh discovery. We can "open doors" for him and to transmit, as teachers, this contagious enthusiasm for inquiry. We are responsible for providing the student with a fund of facts, concepts, and principles, and for assisting him in developing skills in making integrations of these facts, concepts, and principles. We are also responsible for relating the "tools" of a given discipline to the larger context in which they must be used. We must help to develop the student's ability to think, i.e., the ability to dig out facts, analyze them, separate the irrelevant, and come to a decision based on these facts. We have failed if we merely stuff students with facts without teaching them how to use them properly.

The Undergraduate Curriculum

Agribusinesses today are seeking graduates who have the skill to communicate, organize, and recognize, and solve problems, as well as the ability to make decisions. Thus, a progressive undergraduate curriculum will reflect greater emphasis on the basic sciences, communication, and the broader aspects of education which are not readily attainable by the student after graduation. This calls for an increased emphasis on basic principles in all agricultural courses with a correspondingly reduced emphasis on vocationalism—the arts, skills, and techniques which become quickly outmoded and can be learned easily on the outside through trainee programs now sponsored by many employing firms.

Undergraduate Teaching

We are told that economics is dull, but as a subject, it abounds with exciting problems and issues. If we are to expect increased enrollment in our agricultural economics and business management curriculums, I believe we need to improve our teaching in the introductory course in economic principles. The real challenge is to introduce students to the beginning course in such a way as to challenge their intelligence and to stimulate some lasting interest in the field. We should make the subject meaningful and rewarding to them as citizens and future leaders. Our insistence upon meticulous, rigid, methodical reasoning too often extracts all the life and vigor from economics. We need to make the subject sparkle.

The teacher must concern himself with both the teaching and the learning processes. We can do a much better job of educating if we are able to help others to teach themselves. To accomplish this requires that we continually help the learner to assume more and more of the responsibility in improving the basic steps in learning. These steps are: (1) to develop in the student the desire to acquire knowledge, (2) to help him develop the necessary skills for identifying problems which he will work on, and (3) to help him practice the abilities needed in solving problems. Often a teacher fails to achieve the first step and therefore, wonders why, with the best of intent and endeavor, his achievement is so meager. Too often we don't encourage the student to use his faculties in analysis and synthesis.

What are our goals in teaching? Our task is not to train people but to educate them—not to turn out technicians, but educated people who can learn more from what we have taught them. If institutions would insist upon high teaching standards and if an atmosphere of intellectual challenge and accomplishments is maintained, and if more than lip service is given to the principles of good teaching, then the quality of our teaching would inevitably improve.

THE USE OF INDIVIDUAL STUDY COURSE TECHNIQUES IN THE UNDERGRADUATE CURRICULUM

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INCREASING college enrollments along with the greater emphasis being placed on the quality of college teaching are two important challenges confronting our profession today. Research and experimentation in ways to increase our over-all effectiveness as college teachers possibly deserve as much emphasis as do non-teaching research commitments. Methods of instruction have changed relatively little over the years, but this hardly implies that the ultimate in college teaching methods has been achieved. This paper proposes to re-examine the role of independent study techniques in the college curriculum. While structured independent study systems are not new, the method has been a relatively unused technique in many colleges.

Objections to the commonly used lecture-examination method usually are based on a feeling that students are denied the opportunity to develop adequately the powers of written and oral expression. To stimulate students to learn using more individual initiative is the prime objective of independent study. The basis for increasing interest in independent study rests in: (1) the continuing search for means of educational improvement, (2) a growing opinion that increased responsibility of students for their own education results in a more thorough understanding, and (3) the need for better utilization of teachers.

This paper approaches the problem of individual study techniques from two aspects: (1) within the curriculum as a whole, and (2) within the individual class itself. The first concerns what may be done within the total undergraduate program to stimulate independent learning. The author feels that independent study techniques should be employed during the freshman year as well as the later undergraduate years. A program of special honors courses designed to treat subject areas in considerable depth through library reading and outside papers is an example of what may be done to strengthen the curriculum through individual study. Serving the same purpose is the undergraduate thesis. Some schools are reinstituting them on a trial basis.

The particular techniques that may be employed within any given course are many and varied. One of the most popular is the Independent Papers Plan. Courses conducted on this basis are centered around discus-

[1] The author wishes to express his appreciation to T. T. Stout, Dept. of Agr. Econ., Ohio State Univ., and to M. M. Snodgrass, Dept. of Agri. Econ., Purdue Univ., for helpful comments and criticism received during the writing of this paper.

sion of a series of short papers on topics assigned by the instructor. Formal written examination may or may not be used.

Some individual study techniques may allow more teacher supervision and involve more students than is possible with conventional methods. However, the Independent Papers Plan may increase the work load as a result of the greater amount of subjective evaluation necessary for grade determination.

To summarize, while individual study techniques are many and varied, their common purpose is to stimulate constructive and penetrating individual thought leading to a more complete understanding on the part of students. Such techniques have demonstrated their effectiveness in approaching the problem of differing abilities among students. Although the evaluation of results of various independent study techniques is comparatively difficult, the author believes that in the desire to help each student gain the maximum from his college opportunities, more serious consideration should be given to incorporating some of these independent study techniques into our curricula. Each teacher must experiment with different approaches to the problem to find the one that is most satisfactory for him. Revisions in procedures may become necessary as changes in course content and varying levels of student ability occur.

COMPARATIVE ADVANTAGE AND AGRICULTURAL ECONOMICS UNDERGRADUATE CURRICULA

A. Robert Koch
Rutgers University

ECONOMIC principles are utilized by the agricultural economist in problem-solving situations, but we have tended to overlook the application of economic principles to curriculum development. The concept of comparative advantage can apply to the production of agricultural commodities but can comparative advantage also apply to curriculum development?

The purpose of this paper is: (1) to analyze the professional needs of agricultural economics undergraduates; (2) to indicate how these needs are supplied at the various Land-Grant Colleges; and (3) to present implications from (1) and (2) which apply to further curriculum development.

Past, present, and future employment opportunities form a basis from which to determine the needs of the agricultural economics major. The past employment history of Rutgers University departmental graduates from 1946 to 1960 was found to be as follows:

1) During the 14 year period, 52 majors graduated; 34 participated in the study.

2) Twenty-six or 76 percent were employed in a portion of the Northeast (N.J., N.Y., Md., Del.).

3) Fourteen different occupations were listed.

4) Eighty percent of the graduates are utilizing economic training in present professions.

5) Fifty percent of all graduates are employed by firms related to agriculture, the remainder in nonagricultural employment.

From the point of view of meeting the student's needs, several implications regarding the undergraduate curriculum are evident. The professional phase of the curriculum should be regionally oriented and exploit "agribusiness" employment opportunities.

The Northeast enjoys an advantage in so-called "agribusiness" and general business opportunities, but is this advantage shared equally by other regions? Before modifying present curricula it would be desirable for each department to determine and evaluate the facts concerning past, present and future employment opportunities. A curriculum could then be developed to fit the needs of the student and so exploit regional occupational advantages.

To determine how the needs of undergraduate majors are presently being met the latest catalogs from 36 colleges of agriculture were as-

sembled and the agricultural economics curricula therein analyzed. For purposes of comparison a curriculum developed for a Bachelor of Science Degree in agriculture served as the norm.[1] Of the 36 curricula contrasted to the norm, seven devoted at least the recommended percentage of credit hours to communications (10 percent), while all curricula devoted less than recommended to humanities (10 percent). Only six curricula devoted less than recommended to social sciences (10 percent), while 18 were lacking in recommended basic sciences (20 percent), (physical, biological sciences, mathematics, and statistics). Agricultural and departmental courses accounted for more than recommended in seven curricula (20 percent) and eight curricula (20 percent) respectively. Electives accounted for less than recommended at 10 colleges (10 percent). Certainly we should critically evaluate the liberality of our individual curricula to strengthen the general education phase, particularly in communications and humanities. That we have placed more emphasis on professional training than on more liberal curricula is further indicated by the number of options offered by the 36 departments. From one to four options were offered. If the numerous options meet the needs of the student by providing a useful base for further academic or nonacademic endeavor, they would appear to be justified. However, if we are attempting to bolster lagging enrollments by merely offering a proliferation of curricula, not meeting the student's needs, we are open to considerable criticism. For example, 27 of the 36 surveyed colleges and universities offered an agricultural business management option. Does each of these departments have an advantage in employment opportunities which justifies the curriculum or is a "follow-the-leader" attitude prevalent?

In summary, the curriculum must provide for a broad general education. Furthermore, programs can be strengthened to more nearly meet the needs of the student when it is realized that employment opportunities throughout the United States for agricultural economics graduates are not equal and the implications of comparative advantage are applied to curriculum development.

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[1] Curriculum norm taken from *Curriculum Development,* Work Conference for Schools of Agr., Colo. State Univ., Fort Collins, Colo., July 18-21, 1960, pp. 53-59.

ON-THE-JOB GRADUATE STUDY IN AGRICULTURAL ECONOMICS

BRADFORD D. CROSSMAN AND ROBERT A. FITZPATRICK
University of Massachusetts

THREE years ago the Department of Agricultural and Food Economics at the University of Massachusetts initiated a new program of graduate study for persons employed in agriculture and related fields. The courses are given at intermediate and advanced levels in view of the generally extensive but varied professional experience of the participants.

Class hours are scheduled for convenient access of persons with full-time employment. The program is arranged so that students may enroll for one course per semester, and by following a sequence of course offerings can complete the course requirements for a master's degree either in 4 years or in 3 years plus two summer sessions. There are at present six basic courses in the program: two in farm management, two in marketing, one in aggregate economics, and a research methods course.

Reasons for the Program

The Massachusetts Federation of Extension Workers made the original request for off-campus teaching of graduate courses in agricultural economics. Since the educational adventure began in 1958, over 80 percent of Massachusetts agricultural extension agents have completed two or more graduate courses in agricultural economics. One agent has completed the requirements for a master's degree. Ten others are approved candidates for a master's degree in agricultural economics.

Several reasons can be given for the interest of extension workers in further study of agricultural economics. One reason is that prior college training of these agricultural agents has been in specialized production fields. Educational work with higher capacity farmers operating larger, more specialized farms calls for more training in management and decision making. An agent trained in a specialized production field may feel competent to advise on a seeding or feeding practice, but on questions regarding choice of productive combination or farming system, he may feel quite incompetent. A greater knowledge of the theory of the firm with principles of diminishing returns, substitution, and comparative advantage provides the agent with the ability to analyze a farmer's problem leaving the final choice among the alternative solutions up to the farmer.

An agricultural agent will seek additional training in agricultural economics when he realizes that he is an educator rather than a carrier of

recommended practices. His headful of "facts" accumulated from college teacher, extension specialist, or controlled experiment may have little or no application to an actual production or marketing situation. New technology received from physical and biological sciences must be synthesized with the social sciences. Presently, new scientific knowledge is way ahead of the economic and social structure of our agriculture.

Regretfully, too many extension workers are "technological perfectionists." Their image of what a farmer "ought to do" and "what he wants to do" are quite different. In their devoted effort for the perfect product or output, the perfectionists are quite sure the productive combination yielding the highest quality product or most output per productive unit does pay. Applied economics and other social sciences provide keys of explanation why farmers and managers of other agricultural firms resist many education efforts.

Evaluation of the Program

Among the disadvantages of the on-the-job graduate training are inadequate library facilities near the adult student's home or job. Limited time for reading is another disadvantage of the on-job training.

The experience of the adult on-the-job student is generally an advantage. Examples of economic analysis presented by instructors stimulated spontaneous response from those students who had encountered similar problems in the field.

In our graduate teaching program, with its informal atmosphere, we have encouraged inquiry and discussion. In this way, we have in a sense "smoked out" fallacious economic beliefs and with more and more of the class backing us, improved the analytical faculties of the skeptics. The value of this economic training is reflected in the news columns of these students, their meetings and in the analysis of individual farmer's problems.

THE PROBLEMS OF TEACHING AGRICULTURAL ECONOMICS IN INDIA

H. S. Mann
Ohio State University

THE COLLEGES of Agriculture as well as the Arts and Science Colleges and Universities in India are engaged in the teaching of agricultural economics and it is necessary to improve and develop the training facilities in both types of institutions. The problems of teaching agricultural economics relate to the students, the curricula, and the teachers.

A major handicap of students of agricultural economics who come from the cities is their ignorance of the conditions of life and work of the farmer. One cannot be a good student of agricultural economics without an intimate knowledge of how the village community functions. Methods have to be devised to expose students from the cities early in the first year of their college to village life and work, if this has not already been done at school.

An undergraduate in a college of agriculture hardly gets as much of economics and agricultural economics in 4 years as a student in an Arts and Science College gets during the first 2 years of college. For those who work for an honors degree in economics in an Arts and Science College, economics accounts for more than half of the total course work. Mosher has outlined the minimum general courses in agricultural economics for undergraduates in Colleges of Agriculture in Asia and Latin America.[1] These can be supplemented by courses in economic theory and statistics.

The master of science program in agricultural economics as it is now offered by some Colleges of Agriculture is most inadequate. No courses are offered and the student is expected to read at home some books out of a recommended list in order to be able to write the examination. The master's program in economics as provided by the universities is divided into part I and part II each requiring 1 year's residence at the end of which the university gives the examination. There are four papers for a master of arts part I; value, distribution, and economic welfare; economics of agriculture and industry; economic history; and economic statistics, or sociology or political science. For a master of arts part II the first three papers are: income, output, and employment; economics of labor; and economics of development. For the fourth paper the student

[1] Mosher, A. T., "Education, Research and Extension in Agricultural Economics in Asia and Latin America Today," *Proceedings of the Tenth International Conference of Agricultural Economists*, Oxford Univ. Press, 1960, p. 200.

can take one of four options of advanced economic statistics, history of economic thought, international economics or thesis. Each paper requires five hours of class and seminar work per week for the year. In order to meet the increasing demand for trained agricultural economists for extension, teaching and research, the universities in India should make provision for the master of science degree in agricultural economics besides the master of arts economics degree. For master of science part I courses in farm management and rural sociology may be introduced in place of economic history and economics of industry. For master of science part II production economics may be introduced in place of economics of labor. Courses in agricultural prices, cooperatives, and agricultural marketing may be provided as options in paper IV. In the interests of uniformity of standards the curricula for a master of science agricultural economics should correspond with the curricula for the same degree in the universities.

To raise the level of the doctoral program it may be necessary to limit the provision for Ph.D. in agricultural economics to one university in each State and strengthen the staff and library facilities there. A minimum residence of 1 year beyond the master's degree should be required of Ph.D. candidates at this university which will provide courses in research methodology advanced economic theory, quantitative methods, statistics, and seminars in the fields of special interest of the students. At the end of this period the candidate should be given a general comprehensive examination after which he may undertake off-campus research under proper supervision on a subject which he selects while in residence.

The Department of Agricultural Economics in a College of Agriculture, which has the master's program should have at least seven members for graduate instruction. One specialist would be required for each of the fields of economic theory, statistics, rural sociology, production economics, farm management, cooperatives and marketing. If a university starts a master of science agricultural economics program, it should have a professor of agricultural economics and six specialists in the above fields in addition to its present staff. If there are good Arts and Science Colleges at centers where rural universities are being developed efforts should be made to bring these within the orbit of the rural university.

The possibility of having a regular program of summer seminars in Asian universities with the cooperation of American universities should be explored. This would give the agricultural economists from the United States opportunity to study first-hand the conditions of under-developed areas. The Asian agricultural economists who would attend these seminars could learn about the latest research techniques and get guidance for their research projects. Later developments could be taken care of by correspondence.

AMERICAN FARM ECONOMIC ASSOCIATION: REPORTS AND MINUTES

REPORT OF THE PRESIDENT

Fort Collins, Colorado, August 16, 1961

I am happy to report that the Association has never been in better condition. At the present time, our membership is at an all-time high and our financial condition is excellent.

We had an outstanding and well-attended Winter Program at St. Louis as all of you who attended will attest. Our meeting here at Fort Collins has had a very large attendance, including the women and children, who make our Summer Meeting such an enjoyable affair socially as well as professionally. Our many important committees have worked long and hard and have generally produced very fruitful results.

If I appear to be boastful, it is not for my own contributions during the year. This is a remarkable Association in that it has a very large number of persons who are not only highly talented but are exceptionally cooperative, responsible, and willing to go all out in fulfilling their individual assignments. In this connection, it is perhaps worth mentioning that more than 120 members of the Association served this year as members of committees and that 130 persons participated in the Fort Collins program. These are the real building blocks for a successful and vigorous association and, with their help, I have found my year not a burden but a real pleasure. To all of you who have been so generous in helping me make this such a successful year, I wish to extend my heartfelt thanks.

In the interests of brevity, I can report only a few of the highlights of the year which will be of most general interest to you.

(1) With the greater consciousness of preserving our historical records which has come with our reaching the half-century mark as a professional association, we have taken steps to establish an archive by accepting the invitation of the Wisconsin Historical Society to serve as a depository for our Association documents and records.

(2) The publication of a revised Membership Directory is on schedule and, thanks to the diligence of Dr. and Mrs. Kearl and the members of the Directory Committee, will be published as Part II of the November 1961 issue of the *Journal of Farm Economics.*

(3) The promise of this new Directory, plus the vigorous efforts of Larry Boger and the other members of the Membership Committee, has made for an unusually successful year in increasing the membership of our association.

(4) Under Ivy Duggan's leadership, our Sustaining Membership Committee has enrolled some 25 corporate members each of whose $100 annual contribution is so important to the financial well-being of the Association.

(5) The Committee on New Orientations in Research, with the benefit of continued support by the Social Science Research Council, has maintained the vigor which it gained after its reorganization under the able chairmanship of Herman Southworth.

(6) Perhaps the biggest contribution of the Committee just mentioned during this year was the development of a proposal to create a new AFEA Committee on Retrieval of Agricultural Economics Literature, which I appointed in June. This Committee will be under the chairmanship of Harry Trelogan, whose recognition of the problem of cataloguing the vast quantity of pamphlet materials constantly being published in our field and whose very hard work in the preliminary exploration of this problem were instrumental to its development. Harry is now actively engaged in seeking financial support for hiring a professional staff of economists and librarians to devote three years to finding a solution to this very important but difficult problem.

(7) The Agricultural Data Committee, which has made such a fine contribution over the years under the dedicated leadership of Walter Ebling, was this year completely reorganized to make it more broadly representative of the varied interests in official agricultural statistics. Under Carroll Bottum's chairmanship, I believe that we can expect this committee to continue to be one of our most important.

(8) The Student Activities Committee, which had been overburdened with the creation of an awards program for M. S. Theses, was given separate status so that it could devote full time to our steadily growing program of undergraduate clubs, debates, public speaking, etc. Fred Wiegmann deserves strong commendation for his able leadership of this very important committee.

All of our other committees continued their excellent contributions to the progress of our Association. You may find their members listed at the end of this section. While I would like to acknowledge each member by name, I must limit my specific remarks to only a few: to Leonard Miller for his excellent handling of one of our major association activities, the Awards Program; to Maurice Kelso for serving as chairman of our Contributed Papers competition, which has proved to be one of the most popular and important parts of our annual program; to Rex Rehnberg and his staff for being such excellent hosts; to WFEA President Ray Seltzer, who was so cooperative in making our joint program at Fort Collins a success; and to Ken Carpenter, who served so well as Secretary-Treasurer *pro tem.* during Del Mar Kearl's five-month trip abroad.

Finally, let me express for our entire membership the very great gratitude which we all feel for the extremely heavy burden which Del Mar Kearl and Herman Southworth have borne so willingly and so well as Secretary-Treasurer and Editor, respectively. Only those of us privileged to become acquainted with the inner workings of the Association can fully appreciate how invaluable these two officers are and how much self-sacrifice is involved in the performance of their many and too often thankless duties.

Respectfully submitted,
WILLIAM H. NICHOLLS
President

REPORT OF THE SECRETARY-TREASURER

Membership

The Association showed growth in 1960 in all categories of membership except Junior members (Table 1). Over all, the growth was about three per cent. As of June 30, 1961, 4238 membership dues and subscriptions had been collected. This was 476 more than the total for 1960 and 758 more than had been received on the corresponding date in 1959.

The work of the membership committee is reflected in the growth in membership in both 1960 and thus far in 1961. Interest in the handbook (directory) has contributed to the growth in 1961 memberships. As expected, the number of new corresponding members is down in 1961 as compared with 1960. More foreign libraries and firms have subscribed to the Journal as economists trained in this country return to their homes to work.

Cash receipts and expenses

Association cash operating receipts exceeded expenses by $15,185.11 (net cash income, Table 2). Income, exclusive of the 1959-60 special speaker fund, and the dues collected for other associations was $7,757.41 more than in 1959-60. Income from interest and dividends and sales of reprints was up. The major increase, however, was in the dues and subscriptions associated with the large 1961 membership.

Expenditures netted by the same items were $900.91 more than a year ago. There were small reductions in the cost of operating the Secretary's office and the annual meetings expense; but these were more than offset by an expenditure of $1,562.99 for work on the handbook (directory).

TABLE 1. AMERICAN FARM ECONOMIC ASSOCIATION: NUMBER OF MEMBERS AND SUBSCRIBERS, 1960

Classification	1957	1958	1959	1960	1961	Change 1959–60
Sustaining members	—	7	13	24		+ 11
Regular members	2,438*	2,423*	2,227	2,321		+ 94
Junior members	na	na	310	289		− 21
Corresponding members	—	55	146	160		+ 14
U. S. Libraries and Firms	323	347	359	359		—
Foreign Libraries and Firms	486	529	572	592		+ 20
Exchanges	9	17	17	17		—
Total	3,256	3,378	3,644	3,762		+118
Number of copies of JFE	3,310	3,442	3,739	3,911	4,363	+172

* Includes Junior members.

TABLE 2. AMERICAN FARM ECONOMIC ASSOCIATION: CASH RECEIPTS AND DISBURSEMENTS, JULY 1, 1960, THROUGH JUNE 30, 1961

Cash on hand beginning of accounting period		$ 686.67
Current operating—		
Receipts:		
AFEA dues and subscriptions	$38,340.70	
Corresponding member dues	1,963.78	
WFEA dues	849.00	
CAES dues	646.60	
Dividends and interest	3,934.11	
Sale of reprints	3,064.59	
Sale of back issues	1,452.57	
Advertising	150.00	
Annual meeting income (Winter meetings)	318.04	
Miscellaneous	209.20	
Total	$50,928.59	
Expenses:		
Journal printing	$24,779.84	
Editing expenses	429.20	
Printing of reprints	1,902.52	
Purchase of back issues	469.25	
Postage and wires	757.35	
Office supplies	384.36	
Directory-handbook	1,562.99	
WFEA & CAES dues remitted	1,476.10	
Membership refunds	188.30	
Annual meeting	1,430.42	
Awards	2,050.00	
Interest	37.50	
Prorated interest on new bonds	54.22	
Miscellaneous	221.43	
Total	$35,743.48	
Net cash income receipts minus expenses)		15,185.11
Bank loans		
Borrowed	3,000.00	
Repaid	2,500.00	
Balance owed		500.00
Total		$16,371.78
Advances		
1960 meetings	1,000.00	
1961 meetings	1,500.00	
Increase in advances		−500.00
Investments		
Sold and matured:		
10 shares American Smelting & Ref.	$ 1,428.66	
Treasury Bills	8,722.40	
Total	$10,151.06	
Purchased:		
$10,000 Pacific Tel. & Tel. bonds	10,650.00	
5 shares stock American Tel. & Tel.	463.92	
Balance one share Chase Man. Bank stock	29.70	
Balance one share Comm. Edison stock	37.93	
$5,000 Iowa Illinois Gas & Elec. bonds	5,200.00	
100 shares stock Standard Oil, Ind.	5,319.28	
100 shares stock Continental Can	4,315.38	
Total	$26,016.21	
Excess of purchases		−15,865.15
Balance in checking account		6.63

TABLE 3. AMERICAN FARM ECONOMIC ASSOCIATION: NET GAIN REALIZED DURING YEAR ENDING JUNE, 30, 1961

Net cash income		$15,185.11
Minus:		
Increase in prepaid dues and subscriptions	$360.88	
WFEA & CAES dues not transmitted	22.00	
Loss realized on investments	236.64	
		619.52
Net Gain		$14,565.59

This year's transactions included the investment of $26,016.21 in long term investments. Part of this was a reinvestment of money from the sale of American Smelting and Refining Stock and matured U. S. Treasury Bills, and part was investment of new funds not needed to operate the Association.

Net gain

Our net worth, with all stocks and bonds valued at cost, increased by $14,565.59 (Table 3). Although the net cash income was $15,185.11, liabilities for prepaid dues were increased by $360.88, and there were realized capital losses on the American Smelting and Refining Stock amounting to $236.64.

TABLE 4. AMERICAN FARM ECONOMIC ASSOCIATION: BALANCE SHEET, JUNE 30, 1961

ASSETS		
Cash		$ 6.63
Advance 1961 meetings		1,500.00
Investments (at cost)		
Treasury notes	$ 6,862.10	
Treasury bonds	24,045.54	
Corporation bonds	22,055.21	
Stocks	35,432.32	
Total Investments		88,395.17
		$89,901.80
LIABILITIES		
Deferred credit		
Prepaid membership dues[1]		2,618.08
Bank Note		500.00
WFEA & CAES dues not tramitted		22.00
Net worth		
Balance June 30	$72,196.13	
Net gain during year	14,565.59	
Net worth June 30, 1961		86,761.72
		$89,901.80

[1] Dues and subscriptions for 1962 and 1963.

Balance sheet

Our stock and bond portfolio (Table 4) was increased by new investments of $15,865.15. In addition, $10,151.06 received from the sale of stock and maturing bills was reinvested.

Our liabilities for prepaid Journal subscriptions were $2,618.08; we owed $500 on a short-term note to the local bank, and $22 in dues had not been remitted to WFEA and CAES. These are our only outstanding liabilities.

With all stocks and bonds valued at the market of June 30, 1961, the Association net worth was $132,993.97

Much of the work of the Secretary-Treasurer was performed by Dr. K. S. Carpenter who served in my stead during part of the year. His services are appreciated.

C. D. KEARL
Secretary-Treasurer

ADDENDUM. AMERICAN FARM ECONOMIC ASSOCIATION: 1961–62 BUDGET

Item	1960–61		1961–62
	Budget	Actual	Budget
Receipts:			
AFEA dues and subscriptions	$29,420	$35,940.70	$33,930
Corresponding members	1,200	1,963.78	900
Sustaining members	1,000	2,400.00	2,400
Sale of back issues	1,500	1,452.57	1,450
Sale of reprints	2,600	3,064.59	3,000
Advertising	200	150.00	500
Annual meeting (winter)	370	318.04	300
Interest and dividends	3,600	3,934.11	4,100
Miscellaneous	150	209.20	210
Total	$40,100	$49,432.99	$46,790
Expenses:			
Journal printing	$26,500	$24,779.84	$26,500
Editing fees	2,000	429.20	1,000
Printing of reprints	2,500	1,902.52	1,900
Purchase of back issues	200	469.25	400
Awards program	2,165	2,050.00	2,200
Annual meeting expense	1,665	1,430.42	1,625
Postage and telegrams	1,000	757.35	900
Office supplies	600	384.36	600
Subscription refunds and misc.	350	520.95	475
Handbook	2,750	1,562.99	7,800
CPA audit	—	—	125
Total	$39,730	$34,286.88	$43,525
Gain	370	15,146.11	3,265

REPORT OF CERTIFIED PUBLIC ACCOUNTANT

Board of Directors
American Farm Economic Association
Ithaca, New York

GENTLEMEN

We have examined the balance sheet of American Farm Economic Association at June 30, 1961 and the related statement of income and expense for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as seemed necessary in the circumstances.

The fiscal year of the Association ends on June 30, whereas members' dues and subscriptions to the *Journal of Farm Economics* are on a calendar year basis. Consequently, at June 30 of each year the Association has a liability to its members and subscribers for issues of the *Journal* and other services for the remainder of the calendar year. It has not been the practice to reflect this liability (which at June 30, 1961 was in the neighborhood of $17,000) on the balance sheet.

Since this omission overstates the net worth and surplus of the Association available for general purposes, it is suggested that your organization record the liability for current year's unearned dues and subscriptions on your financial statements, or else adopt a fiscal year which will coincide with the dues-paying and subscription year.

Subject to the above exception, the accompanying balance sheet and statement of income and expense, in my opinion, fairly present the financial position of the Association at June 30, 1961 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Respectfully submitted,

MAXFIELD AND COMPANY

Ithaca, New York

REPORT OF THE ELECTION TELLERS

The 1961 Committee of Tellers counted the ballots with the following results:

President-Elect ..... George E. Brandow
Vice-Presidents ..... Sherwood O. Berg
Glenn L. Johnson

RANDOLPH BARKER, *Chairman*
Tellers Committee

REPORT OF THE INVESTMENT COMMITTEE

The activities of the investment committee are shown in the accompanying three tables. The purchases and sales of stocks and bonds were done after careful consideration of the Association's holdings by the investment committee and are in line with the committee's estimate of the desirability of maintaining a balance of investment in stocks and bonds.

Our American Smelting and Refining stock was sold at a loss of $236.64. Our U. S. Treasury bills matured. The income from these together with $15,865.15 in new funds were invested. Our stock purchases were 100 shares of Standard

Oil, Indiana, and 100 shares of Continental Can Company. There were a few purchases of minor amounts of other stocks as shown in the table foot notes.

Our bond purchases were $10,000 of Pacific Telephone and Telegraph and $5,000 of Iowa Illinois Gas and Electric bonds.

The Association's stock and bond holdings are carried in our accounts at their original cost of $88,395.17. The approximate market value at the close of the fiscal year was $135,135.

Prepared for the Committee by
C. D. KEARL
Secretary-Treasurer

TABLE 1. AMERICAN FARM ECONOMICS ASSOCIATION: SUMMARY OF INVESTMENTS, JUNE 30, 1961

	Value	
Stocks	Cost	Market
Stocks on hand July 1, 1960	$26,931.41	$72,862.50
Change in account during year	8,500.91	
Stocks on hand June 30, 1961	$35,432.32	$85,186.62
Dividends received during year	2,321.71	
U. S. Treasury Bonds	Cost	Market
Bonds on hand July 1, 1960	$24,045.54	$20,398.00
Change in account during year	—	
Bonds on hand June 30, 1961	$24,045.54	$20,594.00
Interest income	587.50	
U. S. Treasury Notes	Cost	Market
Notes on hand July 1, 1960	$ 6,862.10	$ 6,809.60
Change in account during year	—	
Notes on hand June 30, 1961	$ 6,862.10	$ 6,946.80
Interest on notes	175.00	
U. S. Treasury Bills	Cost	Market
Bills on hand July 1, 1960	$ 8,722.40	—
Change in account during year	8,722.40	
Bills on hand June 30, 1961	—	—
Interest on bills	277.60	
Corporation Bonds	Cost	Market
Bonds on hand July 1, 1960	$ 6,205.21	$ 6,068.40
Change in account during year	15,850.00	
Bonds on hand June 30, 1961	$22,055.21	$21,910.00
Net Interest on bonds	543.08	

TABLE 2. AMERICAN FARM ECONOMIC ASSOCIATION: STOCKS, JUNE 30, 1961

Item	Inventory 6/30/61		Dividends Received	Market Value	
	No. Shares	Orig. Cost		6/30/60	6/30/61
Am. Smelting Pfd.	10[1]	$ —	$ 70.00	$ 1,385.00	$ —
Am. Tel. & Tel.	89[2]	5,130.15	277.20	7,497.00	10,401.88
Borden Company	114	2,162.41	171.00	5,685.75	6,897.00
Continental Can	100[3]	4,315.38	45.00	—	4,000.00
Chase Manhattan Bank	41[4]	1,080.59	96.81	2,301.00	3,162.12
Clark Equipment	300	2,200.67	360.00	10,500.00	11,100.00
Comm. Edison	61[5]	1,880.81	120.00	3,798.12	4,674.12
E. I. DuPont	25	2,403.25	168.75	5,225.00	5,368.75
General Electric	150	1,920.57	300.00	13,837.50	9,525.00
N. Ill. Gas	17	317.05	21.25	588.63	862.75
Owens Ill. Glass	70	2,925.35	175.00	8,050.00	6,440.00
Sears Roebuck	152	1,845.38	212.80	8,341.00	10,393.00
Std. Oil, Indiana	200[6]	7,356.68	197.05	3,750.00	10,250.00
Std. Oil, New Jersey	48[7]	1,894.03	106.85	1,903.50	2,112.00
Total		$35,432.32	$2,321.71	$72,862.50	$85,186.62

[1] Sold for $1,428.66 (original cost, $1,665.30; loss $236.64).
[2] Rights for part share purchased for $33.92; five shares purchased for $430.00; total $463.92.
[3] One hundred shares purchased for $4,315.38.
[4] One and fraction shares stock dividend; $29.70 paid for balance of share.
[5] One share and fraction shares stock dividend; $37.93 paid for balance of share.
[6] One hundred shares purchased for $5,319.28.
[7] One share stock dividend.

TABLE 3. AMERICAN FARM ECONOMIC ASSOCIATION: BONDS AND NOTES, JUNE 30, 1961

Item	Inventory 6/30/61 Cost	Market Value 6/30/61	Interest 1960/61	Maturity	
				Value	Date
U. S. Treasury Bonds	19,575.53	16,652.00	475.00	19,000	12/15/67-72
	4,470.01	3,942.00	112.50	4,500	6/15/67-72
U. S. Treasury Notes[1]	6,862.10	6,946.80	175.00	7,000	11/15/61
Corporation Bonds:					
Chi., Mil., & St. Paul	971.81	927.50	28.75	1,000	1966
New Eng. Tel. & Tel.	5,233.40	5,370.00	287.35	5,000	9/1/94
Pacific Tel. & Tel.[2]	10,650.00	10,500.00	256.20	10,000	1993
Iowa Ill. Gas & Elec.[2]	5,200.00	5,112.50		5,000	1991
Total	52,962.85	49,450.80	1,334.80	51,500	

[1] Held at Chase Manhattan Bank, New York.
[2] Owned only part of year.

REPORT OF THE AWARDS COMMITTEE

The Association's Awards Program for 1961 followed essentially the procedures that were developed for the 1960 program. It was the second successful year for the Association to offer awards for outstanding Master's theses. As recommended last year, the undergraduate public speaking and debate contests have been handled this year by a separate committee.

Special recognition in the Association's Awards Program must go to the outstanding economists who served as judges for the numerous entries. These individuals have made a major contribution of their time and energy to the Association for which we owe them a genuine debt of appreciation. Without their unselfish efforts, the encouragement of excellence in research that is provided by the Awards program simply would not be possible.

The 1961 Announcement of the Awards program, including a list of those Association members who served as judges and the regulations to be followed, was printed in the November 1960 issue of the Journal. About 450 copies of the 1961 Awards announcements were distributed late in November 1960. A limited follow-up mailing to encourage participation was made in late January 1961.

Participation in the contest and the judges' selections, listed in alphabetical order, were as follows:

Awards for M.S. Theses

M.S. Theses were received from 16 institutions. Contest rules limit each department to one entry. The theses selected for Awards Certificates and checks for $100 each were:

WILFRED KEITH BRYANT, "An Analysis of the Origins and Impacts of Inflation on Farm Input Expenditures, 1910-1958," Michigan State University.

HENRY V. COURTENAY, "An Analysis of Response Variation Encountered with Selected Interviewing Techniques in Consumer Marketing Research," Texas A. and M. College.

WILLIAM ALLAN TINSLEY, "Farm Inventory Valuation and Estimates of Aggregate Farm Income," University of Illinois.

Awards for Ph.D. Theses

Ph.D. Theses were submitted from 18 different institutions. In all, 22 theses were submitted, since a department may enter one thesis for each eight degrees, or fraction thereof, awarded in 1960. The following were selected for Awards Certificates and checks for $250 each:

R. DAY, "Recursive Programing and Production Response," Harvard University.

W. H. DREW, "Demand and Spatial Equilibrium Models for Fresh Apples in the United States," Vanderbilt University.

PINHAS ZUSMAN, "Econometric Analysis of the Market for California Early Market Potatoes," University of California.

Awards for Published Research

A total of 47 publications were evaluated by the Subcommittee for Published Research. The publications selected for Awards Certificates and checks for $250 each were:

ZVI GRILICHES, "Measuring Inputs in Agriculture: A Critical Survey," *Journal of Farm Economics,* December 1960. Submitted in the Theory and Methodology classification.

QUENTIN W. LINDSEY, "Financing the Development of Commercial Farms," A. E. Information Series 77, and "Transforming Low Income Farms into Profitable Commercial Farms," A. E. Information Series 76, North Carolina State College. Submitted in the Agricultural Finance classification.

BORIS D. SWERLING, "Toward Positive Policies for American Agriculture," *Food Research Institute Studies,* November 1960. Submitted in the field of Agricultural Policy.

In addition, the Subcommittee has recommended for Honorable Mention:

RANDOLPH BARKER and EARL O. HEADY, "Economy of Innovations in Dairy Farming and Adjustments to Increase Resource Returns," Research Bulletin 478, Iowa State University. Submitted in the Farm Management and Production Economics classification.

G. S. TOLLEY and L. M. HARTMAN, "Inter-Area Relations in Agricultural Supply" *Journal of Farm Economics,* May 1960. Submitted in the field of General Agricultural Economics.

Award for Best Article in Journal of Farm Economics

The Editors and the Editorial Council performed the task of selecting the best article published in our Journal during 1960. From among the many excellent articles, the one chosen for the Award Certificate and check for $250 was:

WILLIAM R. HENRY and JAMES A. SEAGRAVES, "Economic Aspects of Broiler Production Density," February issue, pages 1-17.

LEONARD F. MILLER, *Chairman*
Awards Committee

REPORT OF THE MEMBERSHIP COMMITTEE

The results of the activities of the Membership Committee are reported by the Secretary of the Association on a calendar year basis in his report. In brief, the membership of the Association has climbed significantly in the last two years and will show an even greater increase in 1961. The major factor contributing to the growth in 1961 is the plan to publish a new membership directory of the Association. Other activities contributing to the expansion of membership in 1961 were as follows:

1. Letters together with the necessary follow-ups, were sent to each of the institutions granting advanced degrees in agricultural economics asking for a listing of the recipients of Master's and Ph.D. degrees during the previous year. All Ph.D. degree recipients, plus all Master's degree recipients who did not plan to continue on for the Ph.D. degree, were added to the potential membership list compiled in 1960. Replies were received from 47 of 51 institutions, and a total of 239 names was added to the potential membership list.

2. The Secretary of the Association requested each department head in agricultural economics to appoint a recruiter for membership in each department. The main function to be performed by this recruiter was to insure that all eligible candidates for membership in the Association would receive an invitation to join and have his name included in the Directory to be published in 1961.

3. After learning from the Secretary of the Association that the total membership had increased substantially and that the only category lagging was that for junior members, the chairman of the Membership Committee sent a letter to all department heads urging them to encourage those in their departments eligible for junior membership to join the Association, and indicating that if their names were received in the Secretary's office by June 1, 1961, or soon thereafter, their names could still be included in the Directory.

As a final point, it should be emphasized that the major contributing factor to the expansion of the membership in 1961 was the preparation of the new membership directory. It is therefore recommended that an annual supplement to this directory be prepared, adding *vita* for new members. It is further recommended that the Executive Committee consider revising the entire directory at least each five years. It is felt that the expansion of membership, together with the reduction in the number of delinquents, will justify this activity.

Respectfully submitted,
L. L. BOGER, *Chairman*
Membership Committee

REPORT OF THE STUDENT ACTIVITIES COMMITTEE

The Student Section of the American Farm Economic Association is a worthwhile part of the Association and one for which sponsorship must certainly be a justifiable source of pride. The Student Activities Committee of the American Farm Economic Association serves as a general policy and advisory group to the student chapters. The chairman of the committee is, in effect, a national advisor to the Student Section of the American Farm Economics Association and attends to most of the routine work of the committee. The student chapters carry on their individual programs during the year, some of which are reported in issues of the student newsletter. The year's activities culminate in the student business meetings, debates, and public speaking contests held at the American Farm Economic Association annual meeting.

The Student Activities Committee, and in fact the Student Section of the American Farm Economic Association, has gradually evolved from a somewhat haphazard facet of the Association to one with some organization and a few "ground rules." As a result each annual meeting over the years has shown some improvement. Student contests have become more challenging, interest has quickened, and awards have become more meaningful and have added their bit to the awards program.

A number of factors have contributed. The interest and support of the Officers and Executive Committee of the American Farm Economic Association has certainly been important. Another major contributing factor has been the continuity and interest preserved in the Student Activities Committee through rotating replacements, with selection of members usually from advisors of Agricultural Economics Clubs in the various schools. (In other words, people who have shown an interest in the students by working with them. This is most important). A third factor contributing to continued improvement has been the selection of the Committee Chairman in recent years from the members of the Student Activities Committee who have had the opportunity to actively help direct the activities during the annual meeting. A fourth factor has been the practice to hold the Committee Chairman to a two or three year term of office. The second year comes a little easier.

In order to be effective in this area there must be a considerable degree of interest and continuity. The "activities" of the Student Section extend throughout the year. That's probably where the Committee name comes from. The Committee Chairman is actively engaged in planning next year's program even while completing the work for this year. He must carry on a rather voluminous correspondence, answer questions, circulate information and act as liaison between the parent and student organizations.

Brochure On Agricultural Economics

This committee recommends that the Executive Committee consider the proposal that the American Farm Economic Association sponsor a brochure in Agricultural Economics. Many other professional societies already do this. The brochure would be aimed at high school students. Many high school students do not even know there is such a discipline as Agricultural Economics, though they are quite familiar with Dairying, Animal Industry, Agronomy and other disciplines.

Undergraduate Student Contests

By June, nine institutions indicated intentions of entering debate teams this year. They were: University of Houston, University of Illinois, Kansas State University, Michigan State University, University of Minnesota, Mississippi State University, Ohio State University, Ontario Agricultural College and Southern Illinois University. Thirteen institutions indicated intention to have entries in the public speaking contest, in some cases more than one from one school. These included the University of Florida, University of Houston, University of Illinois, Kansas State University, University of Minnesota, Mississippi State University, University of Missouri, North Carolina State College, Ohio State University, Oklahoma State University, University of Tennessee and New Mexico State University. Actual participation is not known until contest time in either case, since it has generally been either more or less than indicated "intentions" over the years.

The debate topic this year is: "Resolved, that the United States surplus agricultural capacity should be used to stimulate economic growth in the underdeveloped nations of the world." Public speaking topics are on any subject chosen by the speaker in an area of agricultural economics.

Only one debate team can be entered by one institution but more than one speaker is permitted. A student cannot participate in both speaking and debating. This year debate judges will be team coaches though no coach can judge his own team.

Certificates of Merit will be presented winning participants and their institutions, in addition to the usual personal awards to the winners. The certificates considerably enhance the prestige of the contests and the committee recommends that these awards be continued.

Student Sections

We now have 37 chartered student affiliate sections of the American Farm Economic Association. They are listed below:

1. Ohio State University
2. University of Tennessee
3. North Carolina State College
4. Alabama Polytechnic Institute
5. University of Florida
6. Mississippi State College
7. Virginia Polytechnic Institute
8. Louisiana State University

9. Iowa State University
10. Kansas State University
11. Michigan State University
12. University of Nebraska
13. Oklahoma State University
14. Texas A. & M. College
15. University of Kentucky
16. University of Arkansas
17. Clemson Agricultural College
18. University of Missouri
19. Pennsylvania State University
20. University of Utah
21. Rutgers University
22. South Dakota State College
23. University of Wisconsin
24. Purdue University
25. University of Illinois
26. University of Massachusetts
27. University of Georgia
28. North Dakota State College
29. University of Maryland
30. Ontario Agricultural College
31. New Mexico College of A. & M.A.
32. University of Minnesota
33. Texas Technological College
34. Southern Illinois University
35. University of Houston
36. MacDonald College
37. Montana State College

Student Officers

National Officers for the student section during the past year were:

President ..... Don Epp, University of Nebraska
Vice President ..... Lawrence Stoskopf, Kansas State University
Secretary-Treasurer ..... Jody Stovall, Mississippi State University
Editors ..... Bill Hohenboken, Oklahoma State University
Pete Frans

New Officers for the coming year will be elected at this meeting.

Student Newsletter

The student section publishes a newsletter reporting activities of the various chapters three times each year.

Debating and Public Speaking—1961

Debating

1st. Place:
Jim Bouas, Glenn Huising, University of Southern Illinois
2nd. Place:
Larry Bauer, Hubert Staff, University of Illinois

Speaking

1st. Place—Dennis Lucas, University of Minnesota
2nd. Place—Gary Dickinson, University of Missouri
3rd. Place—Howard Bodenhamer, Kansas State University

Finances

The American Farm Economic Association advances $75 each year to defray the cost of the student newsletter. A similar amount is made available to purchase personal awards for winners in the speaking and debate contests. It is recommended that these allocations be continued.

FRED H. WIEGMANN, *Chairman*
Student Activities Committee

REPORT OF THE AGRICULTURAL DATA COMMITTEE

During the year the chairman surveyed the members concerning areas that should be given attention. Individual members indicated that consideration should be given to the following:

1. Census for 1964.
2. The influence of structural changes in agricultural data gathering methods.
3. Improvement in crop and livestock gathering techniques in general.
4. Further expansion and improvement in cattle and hog reporting data.
5. More data on grazing.
6. Improvement of data on prices.
7. Farm incomes, expenses, output and input data.

A meeting of the committee was held at Fort Collins on August 15. In attendance were Ray Hurley, Sterling R. Newell, George Judge, Hugh Stewart, Rex F. Daly, Leonard Schruben. Schruben was acting chairman. The following topics were discussed.

A. Function of committee approached from direction of:
   1. Data gathering—improving basic data and flow of it into hands of users. Services extended so that data is accompanied by indications of statistical reliability.
   2. Data using—standardize from one area to another in definition of needs. Make it possible to aggregate for large areas and at the same time facilitate analysis on small area basis such as depressed areas and for area economic development.

B. It was recommended this committee be represented on 1964 census advisory committee. The deadline for advance planning is April 1962. Preliminary work by the committee needs to be completed prior to that date.

C. Production coefficient data bank and data resources on standardized basis were discussed briefly.

D. A canvass of data needs by members of AFMA was discussed.

J. CARROLL BOTTUM, *Chairman,* Agricultural Data Committee

REPORT OF EMPLOYMENT COMMITTEE

The employment committee sponsored an employment service at the annual meetings in Ames during August of 1960. Seventy-nine employee applications and forty-five job order forms were filed with the service. The employment office functioned as a catalyst in arranging contact between potential employees and employers. Similar arrangements were made for the 1961 meetings in Fort Collins under the supervision of Harry G. Sitler.

The committee arranged for members of the American Farm Economic Association who were interested to use the service sponsored by the U. S. Employment Service and the American Economic Association and allied social sciences at the 1960 winter meetings in St. Louis. The committee chose this course rather than provide a separate service because of the limited number of members served in past years.

Recommendations of the committee regarding future conduct of the employment function follow:

(1) The membership of the group consist of one member from the host institution to take responsibility for local arrangements, the person in charge of the arrangements the previous year to serve as chairman and a third member from the institution which will be host a year hence. A fourth member would be optional.

(2) Freedom of access to the files of the employment service be provided to the fullest extent consistent with continued broad participation. During the early years of the service some members were reluctant to have their job seeking status become widely known. Because of this, access to the files has been limited in the past three years. Knowledge that information would be available only to employers and employees who had filed applications or orders with the committee seemed to lessen resistance to using the service. Now that the function is well established the committee feels that potential employers can be granted freer access to employee applications without affecting adversely use of the facilities provided by the committee.

(3) Continued study be given to the feasibility of establishing a year-round clearing house for members.

(4) Greater emphasis be given to contacting commercial firms who might be interested in hiring personnel with graduate training in agricultural economics. In the past, contact with this group has been limited. However, the availability of the new directory will provide an opportunity to approach members in this group directly and to invite their participation.

RAYMOND R. BENEKE, *Chairman*
Employment Committee

REPORT OF THE RESOLUTIONS COMMITTEE

1. The American Farm Economic Association, meeting jointly with the Western Farm Economics Association, at Fort Collins, Colorado, August 14-16, expresses its gratitude to the personnel of Colorado State University for the use of their beautiful campus and facilities located at the Foot of the Rockies midst superb scenery, air, and sunshine.

Special thanks are due to the officers of the Western Farm Economics Association and the members of the Department of Economics and Sociology at the University. The members of the Association and their families convey sincere appreciation to the Committee on Local Arrangements, Rex D. Rehnberg, C. Richard Creek and S. Avery Bice, for careful planning of details, thus accounting for the smooth operations and warm hospitality which has prevailed throughout the Conference.

2. In recognition of another successful year, the Association acknowledges the inspiration and work of President Nicholls and the other officers, the special committees, and the editorial staff, who carried on efficiently and effectively the program of the Association.

3. BE IT RESOLVED, therefore, that these resolutions be placed in the records of this meeting and that the Secretary of the Association be instructed to transmit them to the above named individuals and groups.

GEORGE W. WESTCOTT, *Chairman*
Resolutions Committee

MINUTES OF THE MEETINGS OF THE EXECUTIVE COMMITTEE

ST. LOUIS, MISSOURI, DECEMBER 27, 1960

Meeting called to order by President Nicholls at 8:30 P.M.
Present: Members: Allin, Boger, Cochrane, Clodius, Nicholls, Carpenter. Others: Ackerman, Diesslin, Luttrell, Seltzer, Southworth, Trelogan.

Boger moved the adoption of the minutes of Executive Committee Meetings held on August 10 and 12, 1960, as prepared and distributed. Seconded and passed.

President Nicholls presented a progress report concerning committee memberships for 1960-61, and preliminary program arrangements for the summer meeting at Fort Collins.

President Nicholls next reported that progress was being made in obtaining foreign speakers to participate in the session on foreign agriculture at Fort Collins. He indicated that the $300 authorized would be used to help defray the expenses of three outstanding foreign agricultural economists to the summer meetings.

It was moved by Cochrane, seconded and passed that the American Farm Economic Association offer the services of Joseph Ackerman as Secretary to the Fellows Committee.

Boger suggested that every effort be made to encourage greater participation in the activities of AFEA by the Agricultural Estimates and Agricultural Economics Extension Groups.

Luttrell commented briefly on the local arrangements made by AFEA representatives in connection with this year's winter meetings, He asked those present to urge attendance on the part of members at the Annual Banquet.

Southworth reported that it had not yet been possible to engage the services of a Proceedings Editor. Considerable discussion followed as to the possibility of creating the position of Program Secretary who would also serve as Proceedings Editor. President Nicholls asked President-Elect Allin and Southworth to work with him on this matter.

Diesslin presented a progress report for the Directory Committee. In the discussion that followed it was suggested that the Directory include a list of Sustaining Members and a list of Fellows. It was also suggested that the rates for advertising in the Directory be left to the discretion of the Committee. (A copy of this report is attached to the file copy of the minutes of this meeting.)

It was moved by Clodius, seconded and passed that the Secretary-Treasurer of AFEA be charged with the responsibility of collecting and preserving three copies of all of the official documents of the Association, including, but not limited to, blank ballots, announcements of meetings, annual programs and awards

Following a discussion, Clodius moved that the Wisconsin State Historical Society be designated as a depository for the official documents, records, and dead files of the Association. The motion was seconded and passed.

Seltzer reported on arrangements being made for the 1961 Annual Meetings of the AFEA at Fort Collins, Colorado.

Further consideration was given to the taking of a position by the AFEA on the re-establishment of the B.A.E. in the U.S.D.A. No formal action was taken.

Following a reading of the procedure for the election of Fellows in the AFEA,

nominations by members of individuals for Fellows were considered. A list of candidates was prepared for the Fellows Election Committee and submitted to Joseph Ackerman.

President-Elect Allin reported on the preliminary arrangements being made for the 1961 winter meetings with the Allied Social Science Associations. The next winter meetings are to be held in New York City.

President Nicholls was asked to write a letter to President O. Meredith Wilson of the University of Minnesota accepting the invitation to hold the Annual Meeting of the AFEA at that institution in the summer of 1963. It was suggested that in this letter reference be made to the invitation previously received from former President Morrill and Dean Macy.

A letter from Alan Bird was read by President Nicholls outlining a proposal for a committee on Professional Improvement. No action was taken on the proposal at this time.

There followed considerable discussion of Glenn Johnson's proposed rule change for Dissertation Awards Competition. Action was deferred until the August 1961 meeting of the Executive Committee in order to obtain information as to how well the present program is working under recent revisions.

Trelogan presented a report on his investigation of the procedures used by other Associations in handling office and management services similar to those performed by the Secretary-Treasurer of AFEA.

Trelogan next reported on activities of the joint SSRC Committee on Agricultural Economics and AFEA Committee on New Orientations in Research, relating to the Cataloguing of Agricultural Economics literature. (A copy of this report is attached to the file copy of the minutes of this meeting.)

Southworth, as chairman of the joint committee, requested on behalf of the committee, that the Executive Committee of the AFEA in conjunction with SSRC sponsor a conference, including library specialists, for the purpose of further discussing this matter.

It was moved by Clodius, seconded and passed that the Executive Committee of AFEA approve the proposal of the joint committee for a conference on library cataloguing of Agricultural Economics materials.

The meeting adjourned at 2:15 A.M., December 28, 1960.

KENDALL S. CARPENTER
Secretary-Treasurer Pro tem

MINUTES: 1960-61 AFEA EXECUTIVE COMMITTEE

AUGUST 13-14, 1961, FORT COLLINS, COLORADO

Meeting called to order by President Nicholls at 9:05 A.M.

Present: Members: Nicholls, Cochrane, Allin, Kearl, Boger, Clodius, Seltzer Ex-officio). Guests: Southworth, Trelogan, Rehnberg, Brandow, Hardin, Shepherd, Corey, Beneke, Johnson, Seaver, Putnam, Stanton, Wiegmann.

1. Nicholls announced the election of George Brandow, President-elect; Glenn Johnson and Sherwood Berg, Vice-Presidents.

2. Rehnberg reported on local arrangements.

3. Shepherd reported the activities of the Awards Committee. Cochrane moved acceptance of the report. Passed.

4. Following discussion on the problem of selection of winning dissertations, Cochrane moved that President Allin ask the chairman of the new Awards Com-

mittee to make a thorough appraisal of the past awards program for the Ph.D. and M.S. Theses and report at the winter meetings of the Executive Committee. Passed.

5. Wiegmann reported the work of the Student Activities Committee and moved acceptance of the report. Passed.

6. Cochrane moved that the Student Activities Committee review the whole question of career opportunities in Agricultural Economics and bring specific proposals for activities of the AFEA to the Executive Committee at the winter meetings. Passed.

7. Cochrane moved the approval of the minutes of the Executive Committee, December 27, 1960. Passed.

8. Hardin reported the work of the Directory Committee and moved the acceptance of the report. Passed.

9. Cochrane moved that 7,000 copies of the Directory be printed, a charge of $7.50 be made per copy sold and funds be approved to complete publication. Passed.

10. Southworth proposed that vita of new members could be included in an issue of the *Journal of Farm Economics* and reprints be provided.

11. Seltzer reported on the Beringer-Moore controversy regarding authorship of articles for the *Journal of Farm Economics*. Action was deferred.

Recessed at 12:00 noon.

Reconvened at 2:00 P.M.

Present: Members: Nicholls, Cochrane, Allin, Kearl, Boger, Clodius, Seltzer (Ex-officio) Guests: Southworth, Trelogan, Rehnberg, Brandow, Hardin, Shepherd, Corey, Beneke, Johnson, Berg, Seaver, Putnam, Stanton, Wiegmann.

12. Corey reported on arrangements for the winter meetings of the Association in New York City, December 27-29, 1961.

13. Beneke reported on the activity of the Employment Committee and moved acceptance of the report. Passed.

14. Seaver reported on the local arrangements for the annual meetings to be held at Storrs, Connecticut, August 19-22, 1962.

15. Kearl presented the Secretary-Treasurer's report and moved its acceptance. Passed. Thanks was expressed to K. S. Carpenter for his services as Sec.-Treas. Pro-Tem.

16. Boger reported the activities of the Membership Committee and moved acceptance of the report. Passed.

17. Boger moved that a personal letter signed by the President be sent by the Secretary to all new members when membership dues are received. Passed.

18. Kearl moved that an annual supplement of the Directory be a part of the November Issue of the *Journal of Farm Economics*. Defeated.

19. Boger moved that the Secretary assemble costs on alternative methods of publishing an annual supplement to the Directory. Passed.

20. Kearl moved that the audit of Maxfield and Company be accepted. Passed.

21. Kearl moved that the liability of the Association for prepayment of dues be shown in the balance sheet. Passed.

22. Cochrane moved that the Secretary bring to the winter meetings the costs of personal bonds at $50,000 and $100,000 for the Secretary. Passed.

23. Trelogan reported on the activities of the Committee on Retrieval of Agricultural Economics Literature.

24. Clodius moved that the Executive Committee of the Association formal-

ize in regular meeting the action taken by President Nicholls, with the Committee's concurrence by mail, in appointing the Committee on Retrieval of Agricultural Economics Literature. Passed. The committee consists of H. C. Trelogan, (Chm.), Bennett White and H. G. Halcrow.

Recessed at 5:00 P.M.

Reconvened at 8:15 P.M., August 14, 1961.

Present: Nicholls, Allin, Boger, Clodius, Cochrane, Kearl, Seltzer (Ex-officio). Guests: Trelogan, Berg, Johnson, Perlmutter, Southworth, Brandow, Kelso.

25. Jerome Perlmutter, the Proceedings Editor, was introduced to the Executive Committee.

26. Kelso reported on the Contributed Papers Competition.

27. Boger moved that the Executive Committee express gratitude for the report of the Conference on Retrieval Problems Associated with Agricultural Economics Literature, arranged by the Subcommittee on More Adquate Cataloguing System for Agricultural Economics Publications of the Social Science Research Council Committee on Agricultural Economics and the AFEA Committee on New Orientations in Research, held on March 30 in Washington, D.C. The hope was expressed that the newly established Committee on Agricultural Economics Literature Retrieval would manage to carry out the recommendation of that conference. Solution of the classification and related problems would be regarded as being of immeasurable benefit to the profession. Passed.

28.Trelogan reported on a visit with Asher Hobson on the acceptance of the Asher Hobson Library. This is a good library and the owner would like to turn over ownership but retain possession during his lifetime. He would like assurance that a responsible group would take over the library, see that it were maintained and kept reasonably intact. No action was taken.

29. Trelogan reported on his contact with the Borden Company regarding the possibility of awards. The company felt that Agricultural Economics cannot be included in its present awards activities.

30. Trelogan brought attention to the publication of "World Agricultural Economics and Rural Sociology Abstracts," which is available on a subscription basis. Boger moved that a half page ad in the *Journal of Farm Economics* be authorized at no cost to assist with its promotion. Passed.

31. Seltzer reported on the further considerations of the special board of inquiry on the Beringer-Moore controversy. Clodius moved that the report be received. Passed.

32. Clodius moved that, on the basis of the findings of fact of the special board of inquiry, the Executive Committee direct the Editor to restore the C. V. Moore manuscript entitled, "Analytical Framework for Estimating the Production Function for Water" to normal publication procedure. Passed.

33. Southworth reported on the activities of the office of the Editor.

34. Clodius moved that the minutes show that the matter of printing the names of Fellows in each issue of the *Journal of Farm Economics* was discussed and no action was taken. Passed.

35. Clodius moved that the AFEA sell at cost to the WFEA as many copies of the Proceedings Issue of the *Journal of Farm Economics,* December 1961 as they wish to buy. Passed.

36. Clodius moved acceptance of the report of the Editor. Passed.

37. Southworth reported on the activities of the New Orientations in Research Committee. Clodius moved acceptance of the report. Passed.

38. Kearl reported the Sustaining Membership Committee activities.

39. Nicholls presented the report of the Agricultural Data Committee.

40. Kearl presented the Investment Committee report and moved acceptance. Passed. The Executive Committee noted with approval the investment policy.

41. Nicholls reported the nomination by the Fellows Nominating Committee of Oris V. Wells and E. C. Young as Fellows of the Association.

42. Clodius discussed the question of the deposit with or gift to the Historical Society of Wisconsin of AFEA documents. Cochrane moved that any documents now in possession or to be sent later to the Historical Society of Wisconsin become the property of that Society. Passed.

Adjourned at 12:20 A.M.

MINUTES OF THE MEETING OF THE 1961-62 EXECUTIVE COMMITTEE

AUGUST 15, 1961, FORT COLLINS, COLORADO

Meeting called to order at 10:05 P.M. by President Allin.

Present: Allin, Kearl, Nicholls, Berg, Johnson, Brandow, Seltzer (Ex-officio).

Guests: Southworth, Hardin.

1. Hardin extended an invitation to the Association for its 1964 annual summer meetings. An invitation has been received from Ohio State University. Nicholls moved the acceptance of the Purdue invitation. Passed.

2. Kearl presented the budget for 1961-62. Berg moved the adoption as amended. Passed.

3. The provision of secretarial assistance for the Editor and the Secretary-Treasurer was discussed and action was deferred until the winter meeting.

4. Berg reported on arrangements for the 1963 meetings at Minnesota. The proposed dates are August 18-21, 1963.

5. Kearl moved that a price of $2.00 per copy be charged for all back issues of the *Journal of Farm Economics*. Passed.

6. Kearl suggested that there be an AFEA publicity committee.

7. Nicholls moved adjournment at 11:45 P.M.

MINUTES OF ANNUAL BUSINESS MEETING

AUGUST 16, 1961, FORT COLLINS, COLORADO

Meeting called to order at 9:05 A.M. by President Nicholls.

President Nicholls reported on the status and activities of the Association.

Sec.-Treas. Kearl reported the activities of the office of the Secretary-Treasurer.

President Nicholls reported on the CPA audit of Maxfield and Company.

Editor Southworth reported the activities of the office of the Editor of the *Journal of Farm Economics*.

President Nicholls turned the Presidency over to Bushrod Allin.

President Allin announced the date of the winter meetings in New York City to be December 27-29, 1961. The annual summer meetings will be held August 19-22, 1962 at Storrs, Connecticut. The 1963 meetings will be at the University of Minnesota.

The Resolutions Committee report was presented by George Westcott who moved adoption. Passed.

President Allin adjourned the meeting at 9:50 A.M.

REPORT OF THE EDITOR

The Editor's main report is, of course, the *Journal* itself. It has continued to appear regularly, if often a little late. However, the August issue was put to bed on schedule a week ago and should be in the mails before the month is out—an improvement that I hope can be maintained in subsequent issues.

The *Journal* has continued at about the same size, both in number of pages and in numbers of articles and notes, except for a little decrease in pages of proceedings this past year. There have been no striking innovations; the content continues to reflect the subject matter of worthy manuscripts that are received, tempered only by the editorial policy of seeking to include contributions across the broad scope of interest of the profession. You will have noted an increasing number of papers by authors from outside the U. S., and of papers on agricultural development throughout the world—a reflection of the growing "international dimension" of agricultural economics, that is shown also in the programs of recent annual meetings.

There has been no dearth of manuscripts offered for publication. Ninety have come in since January 1 (not including the proceedings papers of the winter meetings). This is an annual rate of 150 manuscripts per year. The rate has stepped up recently; since June 1 it has averaged about one manuscript every two days. This is probably a seasonal increase. But as we have been publishing about 70 contributed papers a year, the rate of 150 manuscripts received per year implies a rejection rate of over 50 percent if the *Journal* is held to its present size.

On time lag, of the 90 manuscripts received since January 1, 30 have been rejected and two others withdrawn by the authors. Sixteen have been accepted for publication: one appeared in May, two will be in the August issue, 10 are definitely scheduled for November, and three await final revision by the authors before scheduling. The remaining 42 manuscripts are still in process: 30 are in the hands of reviewers, 10 have been returned to authors with suggestions for condensation or other revision, and two that had been returned are now back in revised form and await further consideration.

This gives you, perhaps, a little side light on the mechanics of operation of the *Journal*. I wish to express my great thanks to the many who have helped in this operation.

First, to those who have served as manuscript reviewers during the year—again without listing them by name, for there are more than space here would permit. While the greatest burden of reviewing falls upon members of the Editorial Council, we continue to draw heavily upon others throughout the profession to help in handling the large volume of manuscripts as well as for special expert appraisal on particular subjects.

My thanks—and those of the Association—likewise to those who serve as News Notes reporters, a task that involves more effort than may appear from the somewhat mundane listings of new assignments and special activities by which we keep track of our fellow members in the profession.

My special thanks to the members of the Editorial Council for their help and advice. The *Journal* wishes Godspeed to our Book Review Editor, Chet McCorkle, on his new foreign assignment, and bids welcome to Gordon King, who is taking over his duties. And my particular thanks to my Associate Editor, Bob McAlexander, who has carried a heavy burden in the handling of manuscripts

in the area of production economics, especially, and in generally supporting and sustaining the Editor in time of need.

Last but not least, I am most happy to report the filling of the new post of Proceedings Editor, and to introduce to you at this time Jerome H. Perlmutter, of U.S.D.A., who has agreed to take this task from my shoulders. He will handle the publication of the papers presented here at these meetings, and of the winter proceedings as well. With a lively sense of favors yet to come, I express to him my gratitude at his willingness to undertake this assignment.

HERMAN M. SOUTHWORTH
Editor

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C. D. Kearl, Cornell University
H. W. Ottoson, University of Nebraska

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W. W. Cochrane, Director, Agricultural Economics, U.S.D.A.
H. C. Trelogan, Statistical Reporting Service, U.S.D.A.

Tellers Committee

Randolph Barker, Economic Research Service, U.S.D.A., Cornell University
H. E. Conklin, Cornell University
J. W. Mellor, Cornell University

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W. I. Myers, Cornell University

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S. O. Berg, University of Minnesota
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K. A. Fox, Iowa State University
G. L. Johnson, Michigan State University
Nathan Koffsky, Economic Research Service, U.S.D.A.
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Program Committee—1961 Annual Meeting

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K. L. Bachman, Economic Research Service, U.S.D.A.
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Ayers Brinser, University of Colorado
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R. C. Tetro, Foreign Agricultural Service, U.S.D.A.
W. D .Toussaint, North Carolina State College

C. P. Wilson, Kansas State University
R. W. Wilcox, University of Idaho

Local Arrangements Committee—Winter Meeting, 1960

C. B. Luttrell, Federal Reserve Bank of St. Louis
F. L. Goetsch, Doane Agricultural Service

Local Arrangements Committee—1961 Annual Meeting

R. D. Rehnberg (Chairman)
S. A. Bice
W. N. Capener
C. R. Creek
L. M. Hartman
H. J. Hudek
R. B. Hughes, Jr.
H. G. Sitler

Staff Members, Wives, and Secretaries in the Department of Economics and Sociology, Extension Economics, and U.S.D.A. Cooperating Agencies, Colorado State University

MINUTES: WESTERN FARM ECONOMICS ASSOCIATION

MEETING OF THE COUNCIL, AUGUST 14, 1961

President Raymond E. Seltzer presided. The agenda presented by the Secretary-Treasurer for the Executive Committee was adopted as modified.

Following presentation and discussion of financial situation of the Association and of the impact the *Proceedings* issues have on the treasury:

Motion was passed: That the Council recommend to the membership that major papers for publication in the *Proceedings* be limited to 6 pages single spaced, and discussants' papers to 2 pages single spaced. The intent is that speakers are to edit the papers presented at the annual conference so as to meet these space restrictions. Failure to do so will result in nonpublication of the papers in the annual *Proceedings* issue.

Motion was passed: That the Council recommend to the membership that dues of all regular members be increased by 50 cents per year beginning in 1962, the dues of junior members to remain at $1.00 per year.

Following discussion of the benefits and disadvantages accruing therefrom:

Motion was passed: That the Council recommend to the membership the following resolution proposed by S. C. Smith:

Be It Resolved

That we, the members of the Western Farm Economics Association, recommend that our President negotiate the following with the American Farm Economic Association and the editor of the *Journal of Farm Economics:* the editor shall consider for publication, in regular issues of the *Journal of Farm Economics,* papers given at the Western Farm Economics Association meetings, if submitted by the authors, on the basis of their merit as determined by the usual review procedure. These papers shall not automatically be rejected because of prior publication in the *Proceedings* of the Western Farm Economics Association annual meeting.

Following discussion of a possible honorary lifetime membership for certain members who have retired from professional life:

Motion was passed: That the idea of an honorary lifetime membership be referred to the Executive Committee for consideration in 1961-62.

Invitation to meet in Reno, Nevada, in 1962 was accepted in 1960 by the Council. The Executive Committee will determine dates.

Invitation was extended to meet in or near Moscow, Idaho, in 1963.

Motion was passed: That the invitation to meet in Idaho in 1963 be accepted.

ANNUAL MEETING OF THE ASSOCIATION, AUGUST 15, 1961

President Seltzer presided. Minutes of the 1960 annual meeting at Stanford, California, were approved as distributed in the 1960 *Proccedings.*

The Secretary-Treasurer's report for 1960-61 was presented.

Motion was passed: That the Secretary-Treasurer's report be accepted. President Seltzer reviewed WFEA Council actions.

Motion was passed: That the Association adopt the recommendation of the Council relative to restricting length of papers to be published in the *Proceedings,* major papers to be not more than 6 pages single spaced, discussants' papers to be not more than 2 pages single spaced.

Motion was passed: That dues of all regular members be increased 50 cents per year commencing in 1962, dues of junior members to remain at $1.00 per year.

C. R. Harston presented the reports of the Awards Committees and presented the awards. The Awards Committees were:

Graduate Student Paper—	C. R. Harston, Chairman
	J. S. St. Clair
	N. K. Roberts
Research Publication—	J. E. Faris, Chairman
	E. N. Castle
	J. P. Swanson
Extension Contribution—	R. W. Wilcox, Chairman
	Eric Thor
	W. V. Neeley

Awards granted and other efforts deserving of honorable mention were:

1. Graduate Student Paper
   a. A certificate and a $50 cash award to Thomas A. Miller, University of Wyoming, for his Master's thesis entitled "Economic Analysis of Adjustment Opportunities on Dry-Land Wheat Farms in Southeastern Wyoming";
   b. Honorable mention to D. L. Doescher, University of Nebraska, for his Master's thesis entitled "Variable Resource Programing"; and
   c. Honorable mention to A. L. Byrd, Texas A & M College, for his Master's thesis entitled "An Economic Evaluation of Experimental Response of Irrigated Grain Sorghum to Nitrogen."
2. Research Publications
   a. Certificates and $25 cash awards each to Norman R. Collins and Lee Preston, University of California, for their paper published in the 1960 WFEA *Proceedings*, pages 297-314, entitled "Growth and Turnover of of Food Processing Firms";
   b. Honorable mention to G. W. Dean and C. O. McCorkle, Jr., Univesrity of California, for their California Agricultural Experiment Station Bulletin 778, April 1961 entitled "Projections Relating to California Agriculture in 1975"; and
   c. Honorable mention to H. O. Carter and G. W. Dean, University of California, for their article in *Hilgardia*, Volume 30, No. 6, October 1960, entitled "Income, Price and Yield Variability for Principal California Crops and Cropping Systems."
3. Extension Contributions
   a. Certificates and $25 cash awards each to Burt B. Burlingame and Edward A. Yeary, University of California, for their planning and conduct of a farm management short course for commercial bankers;
   b. Honorable mention to W. Y. Fowler, New Mexico State University, for his definition and application of Extension's Role in Agri-business; and
   c. Honorable mention to G. W. Campbell, Jr., University of Arizona, for his contribution to the 1961 feed grain program.

The Resolutions Committee, H. R. Stucky, Chairman, E. J. Working and G. B. Wood, presented the following resolution:

Be It Resolved

That we, the members of the Western Farm Economics Association, recommend that our President negotiate the following with the American Farm Economic Association and the editor of the *Journal of Farm Economics*. The editor shall consider for publication, in regular issues of the *Journal of Farm Economics*, papers given at the Western Farm Economics Association meetings, if submitted by the author, on the basis of merit as determined by the usual review procedure. These papers shall not automatically be rejected because of prior publication in the *Proceedings* of the Western Farm Economics Association.

Motion was passed: That the Association adopt the resolution.

Robert C. Angus, Chairman, reported for the Tellers Committee. C. R. Harston and P. F. Philipp were also on the committee.

E. J. Working, Past President, installed the new officers.

Officers for 1961-62 are:

President—William E. Folz
Past President—Raymond E. Seltzer
Editor-and-Vice President—James S. St. Clair
President-Elect—Emery N. Castle
Secretary-Treasurer—John O. Gerald

H. R. Stucky, Chairman of the Resolutions Committee, presented the following resolutions:

1. Appreciation to Colorado State University

   Be It Resolved

   That this Association express appreciation to Colorado State University for providing us with excellent housing, meals and meeting rooms and for the fine hospitality on the part of all staff members concerned.

   That we express thanks to Director of Extension and Coordinator of Agricultural Programs, Lowell Watts for his sincere Address of Welcome.

   To the Economics and Sociology Department, to the Local Arrangements Committee, and to the many wives we express gratitude for their untiring efforts in making this Joint AFEA-WFEA meeting, the largest joint Association meeting on record, the outstanding success that it is.

   That the Association Secretary be instructed to send copies of this resolution to Dr. R. E. Morgan, President of Colorado State University, Mr. Lowell Watts and Dr. Rex Rehnberg, Head of the Department of Economics and Sociology.

2. Appreciation to our officers

   Be It Resolved

   That we express our sincere appreciation to our President Raymond E. Seltzer, Editor-and-Vice President Clive R. Harston, President-Elect William E. Folz and Secretary-Treasurer John O. Gerald for their time and effort.

Motion was passed: That the Association adopt the resolutions.

President Folz discussed plans for the 1962 meeting in Reno, Nevada, and indicated dates that may be selected. He also informed the Association of the 1963 meeting in Idaho.

Respectfully submitted,

JOHN O. GERALD
Secretary-Treasurer

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